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Instruction Book

30S-1 RF Linear Amplifier

PUBLISHED BY DIRECTION OF
COMMANDER, NAVAL SEA SYSTEMS COMMAND

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Instruction Book

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1. General Description.

The 30S-1 RF Linear Amplifier consists of a 1-stage linear amplifier and the necessary power supplies. It is capable of the maximum legal input power in the amateur bands between 3.5 and 29.7 mc. It operates in either CW or SSB service with any exciter (such as KWM-1, KWM-2, or 32S-()) capable of 80 watts pep. output. In addition, the amplifier may be operated outside the amateur bands at any frequency between 3.4 and 30 mc by retuning its input circuits.

2. Installation and Adjustments.

a. Set the 30S-1 on the floor beside the operating desk.

b. Unlock the power supply compartment door with the key furnished, pull out the door, and remove it. The key is packed in a small cloth bag which is tied

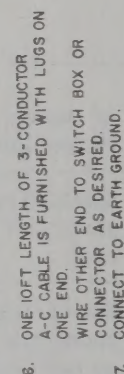
to one of the knobs on the front panel. Uncrate the high-voltage transformer from its separate shipping container.

c. Loosen the exciter power supply shelf, shown in figure 4, and tip it back out of the way. This shelf provides space for mounting the exciter power supply inside the 30S-1 power compartment, if desired. The shelf may be loosened by removing three flat-head machine screws along the left side and two sheet metal screws along the back edge. The screw heads on the left side are on the inside of the cabinet, and the screwheads along the rear are on the outside of the cabinet.

d. Mount the high-voltage power supply transformer over the mounting holes in the bottom plate of the compartment. Be sure to position the transformer with terminals 1, 2, 3, 4, 5, 6, 10, and 11 toward the top of the power supply compartment. Secure the transformer to the cabinet floor with the four screws supplied.

TABLE 1. EQUIPMENT FURNISHED WITH 30S-1

QUANTITY	DESCRIPTION	FUNCTION	COLLINS PART NUMBER
1	Ac power cable, three number 12 wires, 10 feet long, with lugs on one end.	Ac power	545-3123-00
2	Shielded cables, 10 feet long, with phono plug (part number 361-0062-00) on each end.	Alc and antenna relay cables	426-2029-00
1	RG-58/U cable, 20.5 feet long, with phono plug (part number 261-0062-00) on each end.	Rf input cable	426-5079-000
1	RG-8A/U cable, 10 feet long, with type C connector (part number 357-9261-00) on each end.	Rf output cable	545-3122-00
1	Bag containing fuses.	Spares	544-6885-00
1	Polyethylene spiral wrapping 6 feet long.	Lacing the inter-connecting cables	152-3370-00



- NOTES:
1. USE ONLY WITH 2 AND 6 METER CONVERTERS.
 2. 56F-2 POWER SUPPLY MAY BE LOCATED ON SHELF INSIDE 303-1 LOWER CABINET ASSEMBLY.
 3. CONNECTIONS AS SEEN THROUGH FRONT DOOR ON LOWER ASSEMBLY.
 4. CONNECT HEADPHONES TO PHONES JACK, FRONT OF 75S-1. CONNECT MICROPHONE TO MICROPHONE JACK, FRONT OF 32S-1.
 5. THIS COAXIAL CABLE IS FURNISHED IN 20.5 FT LENGTH, DO NOT SHORTEN OR SUBSTITUTE ANY OTHER LENGTH.

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NOTE

In order to insert the rear screws in the mounting holes, it may be necessary to use beeswax or some other type of adhesive on the screwdriver head.

e. Connect the lead from the ceramic post insulator to the center tap (terminal 8) of the transformer. This insulator is shown in figure 4 in front of the 3B28 filament transformer, T202.

f. Connect the two leads from the lower terminals of the two surge suppressing resistors, R222 and R223, to terminals 7 and 9 of the transformer. These resistors are mounted behind the rectifier tube sockets.

g. Connect the wires of the cable to the terminal strip across the top edge of the transformer frame according to the wire code information of figure 4.

h. Replace the exciter power supply shelf. Secure the front edge of the shelf to the back edge of the transformer with spacers and screw provided. Replace the two sheet metal screws along the rear, and replace the three flathead machine screws along the left side.

i. If the exciter power supply is preferred on the operating desk, disregard note 2 of figure 1 and note 1 of figures 2 and 3.

j. If the exciter power supply is preferred in the lower compartment of the 30S-1, remove the 516F-2 from its case before mounting on the shelf in the 30S-1. Plug the 32S-() (or KWM-2) into the 516F-2. Plug the 516F-2 into J204. This jack is located inside the 30S-1 on the flange of the power supply shelf. See figure 4.

k. Connect the 30S-1 power supply input terminals to the ac line according to the information given in figures 1 through 3. Run the ac power supply leads through the entry conduit from the rear of the cabinet. Connect the white wire to the neutral. The ac input terminals are shown in figure 4.

l. Install the rectifier tubes. Install plate caps on the rectifier tubes. Make sure the plug-in time-delay relay is installed on the shelf in the power supply. The delay relay looks like an octal-base tube. Refer to figure 15. Open the top cover of the rf compartment. Check that thermal relay K102 is properly positioned as shown in figure 14. Check the entire rf compartment to see that no short circuits exist.

m. Connect a 32S-(), KWM-2, or KWM-1 exciter as shown in figures 1, 2, or 3. A length of polyethylene spiral wrapping is included with the 30S-1 for making a neat bundle of interconnecting wires behind the operating desk.

n. If KWM-1 models above serial number 861 are used with the 30S-1, it will be necessary to bring out alc and "ground-on-transmit" connections to P1, terminals 19 and 20. This will allow the switching circuits of the KWM-1 to control the antenna

changeover relays of the 30S-1 when connected to J203 on the 30S-1. Make these breakout connections to P1, using shielded wire and connect to 30S-1 ALC and ANT. RELAY jacks with phono plugs.

o. If KWM-1 models below serial number 861 are used with the 30S-1, it is necessary to make connections inside the KWM-1 for alc. Use an ohmmeter to locate the feedthrough capacitor, C169, which is connected to pin 19 of J5. Connect a wire from this feedthrough capacitor to pin 7 of tube socket XV10. In addition, it will be necessary to connect an external dropping resistor and relay as shown in the detail of figure 3, for KWM-1 control of changeover relays in the 30S-1. Using an ohmmeter, locate the feedthrough capacitor, C206, which is connected to pin 20 of J5 (in KWM-1). Connect a wire from terminal 8 of TB1 in KWM-1 to C206. Make corresponding breakout connection from P1-19 with shielded wire and connect breakout to 30S-1 ALC jack with a phono plug. External to the KWM-1, connect a 10,000-ohm, 5-watt resistor and a relay coil in series from J5-20 to a ground on the rear of the KWM-1 chassis. Use a relay, such as Collins part number 972-1346-00, with a 10,000-ohm, 10-ma coil and a set of normally open contacts. Connect the normally open contacts through a piece of shielded wire (or microphone cable) and a phono plug to ANT. RELAY (J203) on the 30S-1. This arrangement will allow KWM-1 switching of 30S-1 changeover relays.

WARNING

BE CAREFUL to avoid the 260-volt B+ present on the resistor and relay coil connections.

NOTE

The rf cable supplied for connecting the 32S-() or the KWM-2 to the 30S-1 is 20.5 feet long. DO NOT cut this cable. This length is optimum in maintaining the low-distortion figure for which the equipment was designed. An additional 2.5 feet of cable, with connectors, is required for connecting the KWM-1 output to the 30S-1. This makes a total of 23 feet for the KWM-1 connection.

p. Refer to figure 6. Set POWER-OFF switch (1) to POWER. Set SSB-CW switch (5) to SSB and MULTIMETER switch (4) to FILAMENT VOLTAGE. Be sure the plate power is off and the rectangular red pilot lamp (7) is out. The following adjustments are made without excitation.

q. Set filament voltage to 6.0 volts ac with FIL ADJUST. Refer to figure 5.

r. Set MULTIMETER switch (4) to PLATE VOLTAGE.

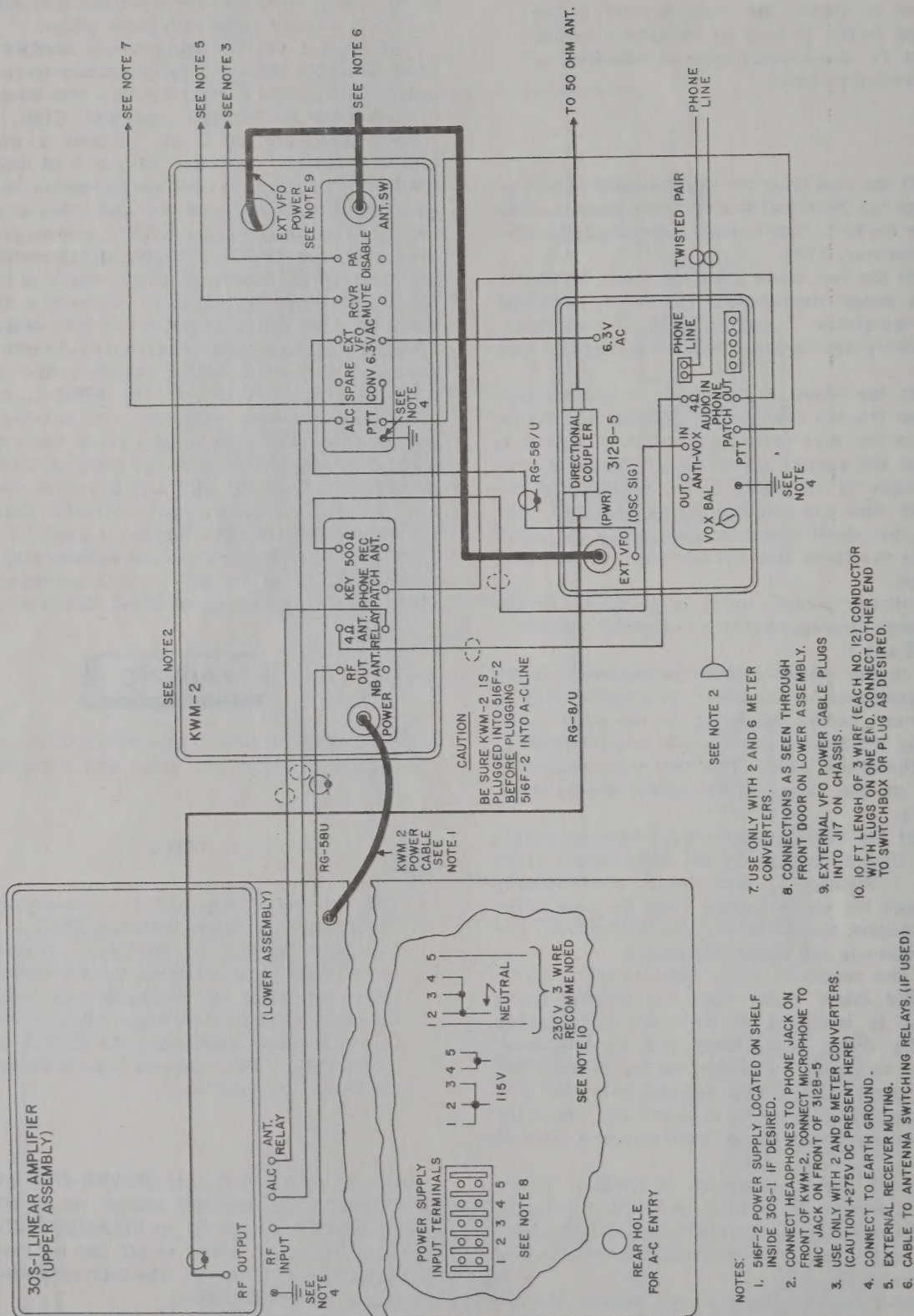


Figure 2. Station Interconnections with KWM-2

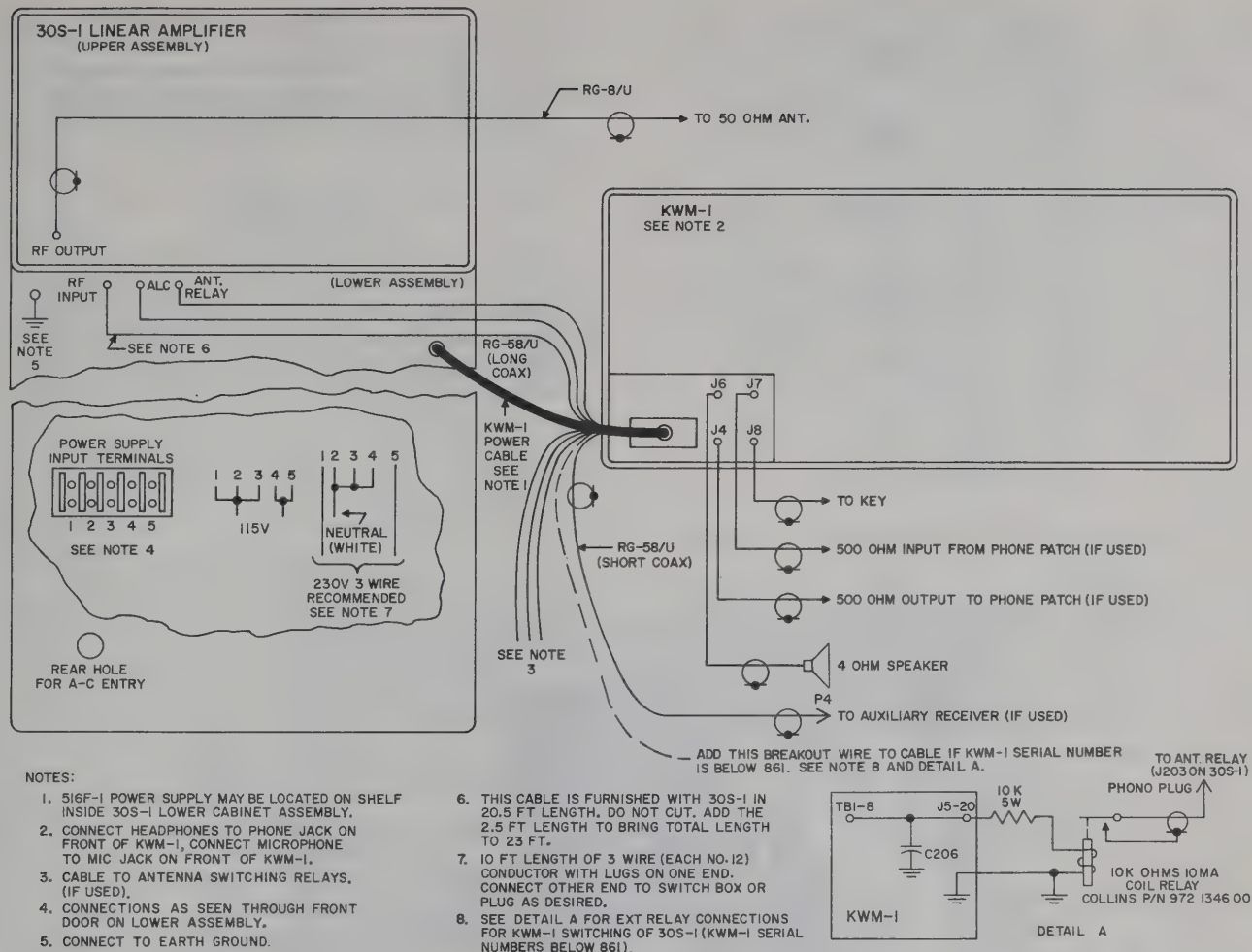


Figure 3. Station Interconnections with KWM-1

NOTE

Due to the 3-minute delay of time-delay relay K202, plate voltage will not come on until 3 minutes after filament voltage has been applied. During this 3-minute wait, the exciter may be operated as a low-power station.

WARNING

Do not make bias adjustments with the power on. DO NOT BLOCK THE POWER SUPPLY INTERLOCK SWITCH. Lethal voltages are present in the power supply.

s. After the 3-minute delay time has elapsed, press the plate ON button. The rectangular red pilot lamp

should light, and plate voltage should be indicated on the MULTIMETER (9).

t. Set exciter MIC GAIN control fully counter-clockwise to produce zero drive, and set the exciter EMISSION switch to TUNE position. Idling plate current will be indicated on the 30S-1 PLATE CURRENT meter (8).

u. Remove the front cover from the power supply compartment; make a small change in setting of BIAS ADJUST; replace cover and read PLATE CURRENT meter. Repeat until the no-signal plate current is 200 ma.

v. When these adjustments are completed, press the plate OFF pushbutton (2).

3. Operation in SSB or CW Service. (Refer to figure 6.)

a. Set POWER-OFF switch (1) to POWER.

b. Set exciter band switch to desired band and exciter meter switch to PLATE. Adjust exciter idling

late current to 50 ma. Be sure 30S-1 and exciter
 lc jacks are connected together. When the 3-minute
 relay time has elapsed, press plate ON pushbutton.
 et exciter meter switch to ALC. Adjust exciter ALC
 ZERO for an exciter meter indication of zero alc.
 Refer to procedure in exciter instructionbook. Press
 30S-1 plate OFF pushbutton.

c. Tune and load the exciter into the antenna or
 dummy load, whichever is connected to RF OUTPUT
 jack J103 at the rear of the 30S-1. Tune and load
 32S-() or KWM-() according to its instruction book,
 EXCEPT load only to 200 ma plate current. This
 change in procedure for 32S-() or KWM-() is
 necessary to obtain the low system distortion for
 which this equipment was designed.

NOTE

Use a 100-watt dummy load (such as Collins
 DL-1, 52 ohms) unless antenna and feedline
 system present an swr not exceeding 1.25 to 1.

CAUTION

Do not leave the dummy load connected to the
 30S-1 output with the 30S-1 power on unless
 dummy load used has power dissipating ca-
 pacity equal to or greater than the output
 power of the 30S-1.

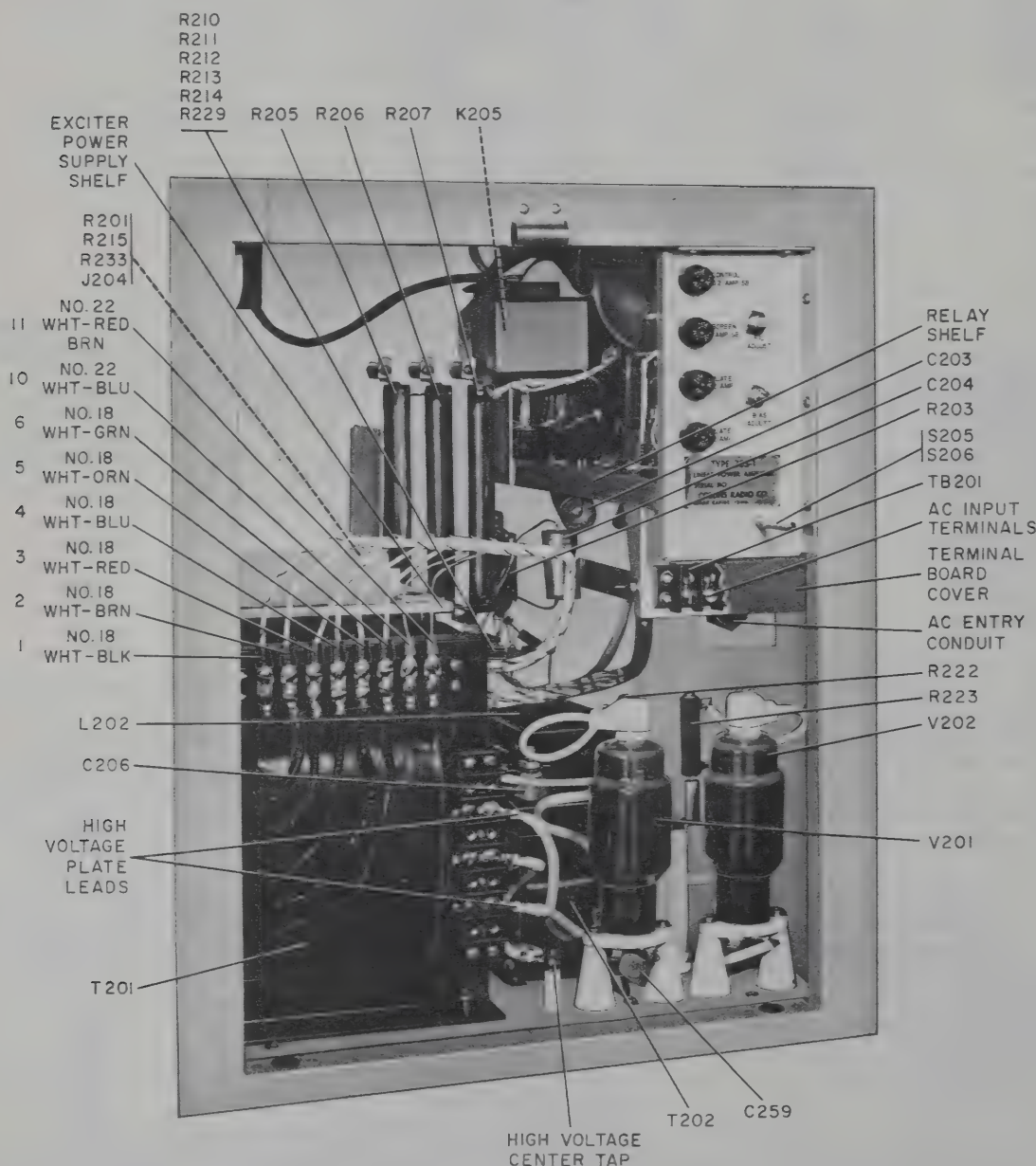


Figure 4. Power Supply Compartment, Parts Location and Wiring

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d. Remove exciter output by turning microphone gain control to OFF. If a different make of exciter is used, place it in STANDBY.

e. Press 30S-1 plate OFF button (6), and turn 30S-1 BANDSWITCH (3) to desired band.

f. Set MULTIMETER switch (4) to TUNING & LOADING.

g. Set SSB-CW switch (5) to desired mode of operation.

h. Disconnect dummy load and connect antenna to RF OUTPUT jack.

i. Press plate ON pushbutton (6). The pilot lamp (7) should light if the 3-minute delay time has elapsed.

j. With exciter EMISSION switch in LOCK KEY position, increase exciter output by increasing microphone gain until 350-ma plate current is indicated on PLATE CURRENT meter (8).

k. Observe the MULTIMETER (9). Adjust the TUNING control (10) for MULTIMETER dip, and adjust the LOADING control (11) for MULTIMETER 0 until the meter indication is 0 at the dip.

l. Adjust exciter output (with exciter MIC GAIN control) until 30S-1 peak plate current is 300 ma for SSB or 400 ma for CW.

m. Redip and reload with the TUNING and LOADING controls, keeping MULTIMETER indication at 0.

n. Recheck PLATE CURRENT meter indication for proper value as given in step 1. Repeat steps l and m, as necessary, until power amplifier is loaded to 400 ma for CW or 300 ma peak for SSB. DO NOT switch from SSB to CW (or from CW to SSB) while operating. BE SURE 30S-1 plate voltage is off when changing setting of SSB-CW switch (5).

o. For SSB operation, set 32S-() (or KWM-2) EMISSION switch to USB or LSB. Set exciter METER switch to ALC. Adjust MIC GAIN for meter indication of 6 db for 32S-() or KWM-2 (or S6 for KWM-1)

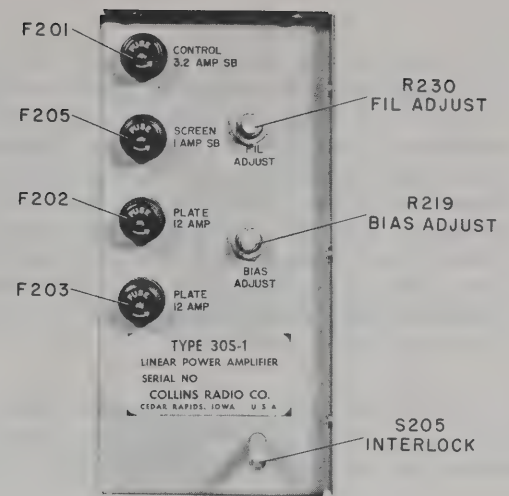


Figure 5. Heater and Bias Adjustment Locations

for peak voice readings in normal operation of the exciter. For CW operation, set EMISSION switch to CW. The transmitter is now ready to operate.

p. Pressing the plate OFF pushbutton (2) automatically switches the exciter to the antenna for low-power operation.

CAUTION

Wait at least 5 seconds after pressing plate OFF button (2) before pressing plate ON button (6). This delay is necessary to allow the step-start circuit to recover.

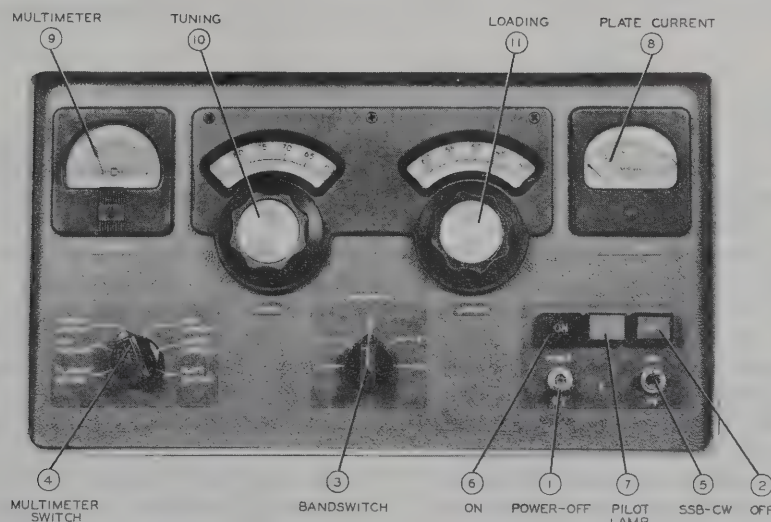


Figure 6. 30S-1 RF Linear Amplifier, Operating Controls

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NOTE

The cathode-input circuit on the 3.5-mc band is factory tuned for minimum input vswr at 3.8 mc. The vswr will increase slightly for operation on other parts of the band. This will cause small changes in the normal load setting of the exciter. It is possible, but not necessary, to adjust L114 for minimum vswr at a favored part of the 3.5-mc band. The cathode input circuits for the 7-, 14-, 21-, and 28-mc bands are broad enough that no adjustments are necessary within these bands.

q. Table 2 lists full-scale and normal meter indications for all scales of the multimeter. Full-scale indication on the PLATE CURRENT meter is 1000

ma, and normal indication on this meter is 400 ma for CW or 300 ma on voice peaks for SSB. According to FCC regulations, the drive power to the grounded-grid amplifier must be added to PA plate power input to determine total final amplifier plate power input. The above plate current ratings keep the amplifier input within legal limits.

CAUTION

If the 30S-1 is to be driven by an exciter not having automatic load control (alc), monitor the 30S-1 grid current continuously while transmitting, and keep the drive level at a point which just produces a slight kick in the grid current indication.

TABLE 2. MULTIMETER SCALE VALUES

MULTIMETER SWITCH SETTINGS	FULL-SCALE INDICATIONS	NORMAL INDICATIONS
FILAMENT VOLTAGE	10 volts ac	6.0 volts ac.
BIAS VOLTAGE	-100 volts dc	Voltage necessary to set idling plate current to 200 ma.
TUNING & LOADING	Not applicable	0 when 30S-1 is properly loaded.
GRID CURRENT	5.0 ma	Never more than 0.2 ma in CW, 0 in SSB.
SCREEN CURRENT	50 ma	Never more than ± 25 ma.
PLATE VOLTAGE	5000 volts	2000 for CW. 3000 for SSB.

4. Circuit Description.

4.1 BLOCK DIAGRAM.

Figure 7 is a block diagram of the 30S-1 RF Linear Power Amplifier. The power amplifier stage is a single ceramic tetrode which is cathode driven. The control grid is grounded for rf by capacitor C104, and the screen grid is connected directly to ground. The plate power supply, the screen grid power supply, and the control grid bias supply are connected in series. The junction between the plate power supply and the screen grid power supply is grounded through the screen current meter shunt. This arrangement places the cathode at negative potential with respect to the screen grid. The bias supply is connected between the cathode and the control grid. Provisions are included for rf negative feedback to improve linearity and for automatic load control to prevent overdrive.

4.2 INPUT CIRCUITS.

Refer to figures 7 and 16. Pi-network broad-tuned circuits and the interconnecting rf feedline match the 50-ohm input impedance to the cathode impedance, which is approximately 100 ohms. The 20.5-foot length of cable (furnished) is necessary between the 32S-1() (or KWM-2) driver and the 30S-1 input circuits. This is due to the necessity of having an even multiple of 180-degree phase shifts between driver plate and power amplifier grid. The cable length and the 30S-1 input circuits together accomplish this. An even multiple of 180-degree phase shifts is necessary because the varying drive intensity causes a change in the PA cathode impedance which is translated to a shift in reactive impedance at the driver plate. The shift in reactive impedance, at the driver plate, results in phase modulation of the driver and increases the total overall distortion of the system. A 2.5-foot additional length of cable

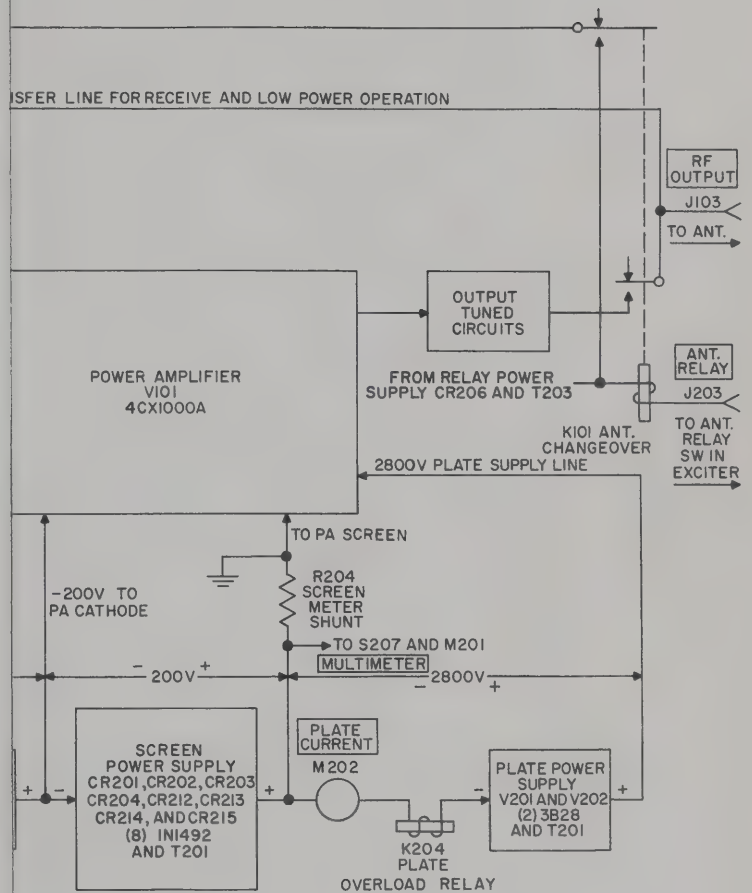


Figure 7. 30S-1, Block Diagram

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GRID CURRENT	5.0 ma	Never more than 0.2 ma in CW, 0 in SSB.
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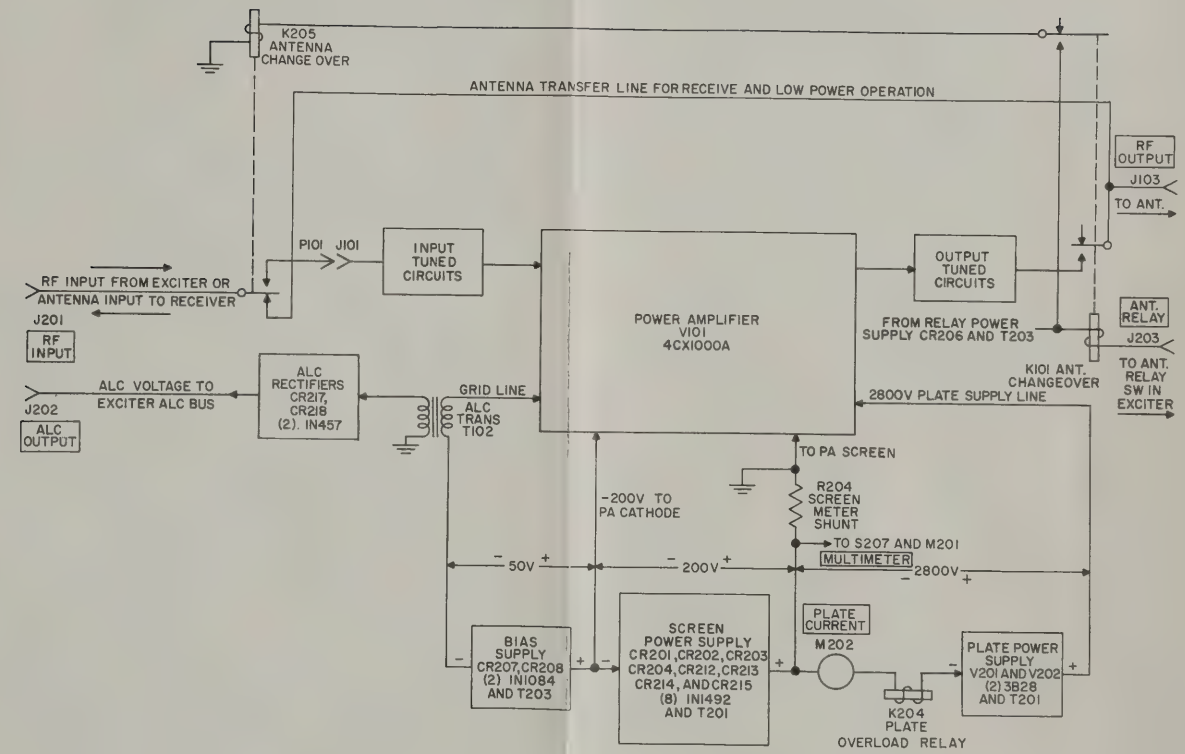


Figure 7. 30S-1, Block Diagram

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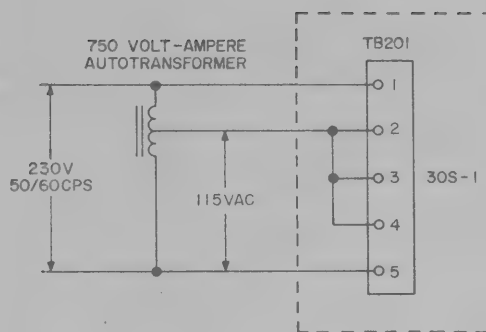
is required to bring the total interconnecting cable length to 23.0 feet for use with the KWM-1 as a driver. Drive power required for maximum legal input on SSB is 80 watts pep. nominal.

4.3 OUTPUT CIRCUITS.

The plate circuit of the power amplifier is tuned by a pi network consisting of C120, L109, L104, C121, and C122. Capacitors C121 and C122 are ganged together and are adjusted by front panel control (LOADING) for matching the pi-network circuit to the impedance of the antenna and feed system in use. Capacitor C120 may be adjusted by the TUNING control on the front panel for resonating the tank circuit to the frequency in use. Output from the plate tank circuit is connected through the contacts of antenna changeover relay K101 to the antenna when the control circuits are switched to transmit function.

4.4 POWER SUPPLY CIRCUITS. (Refer to figures 7, 8, 9, and 16.)

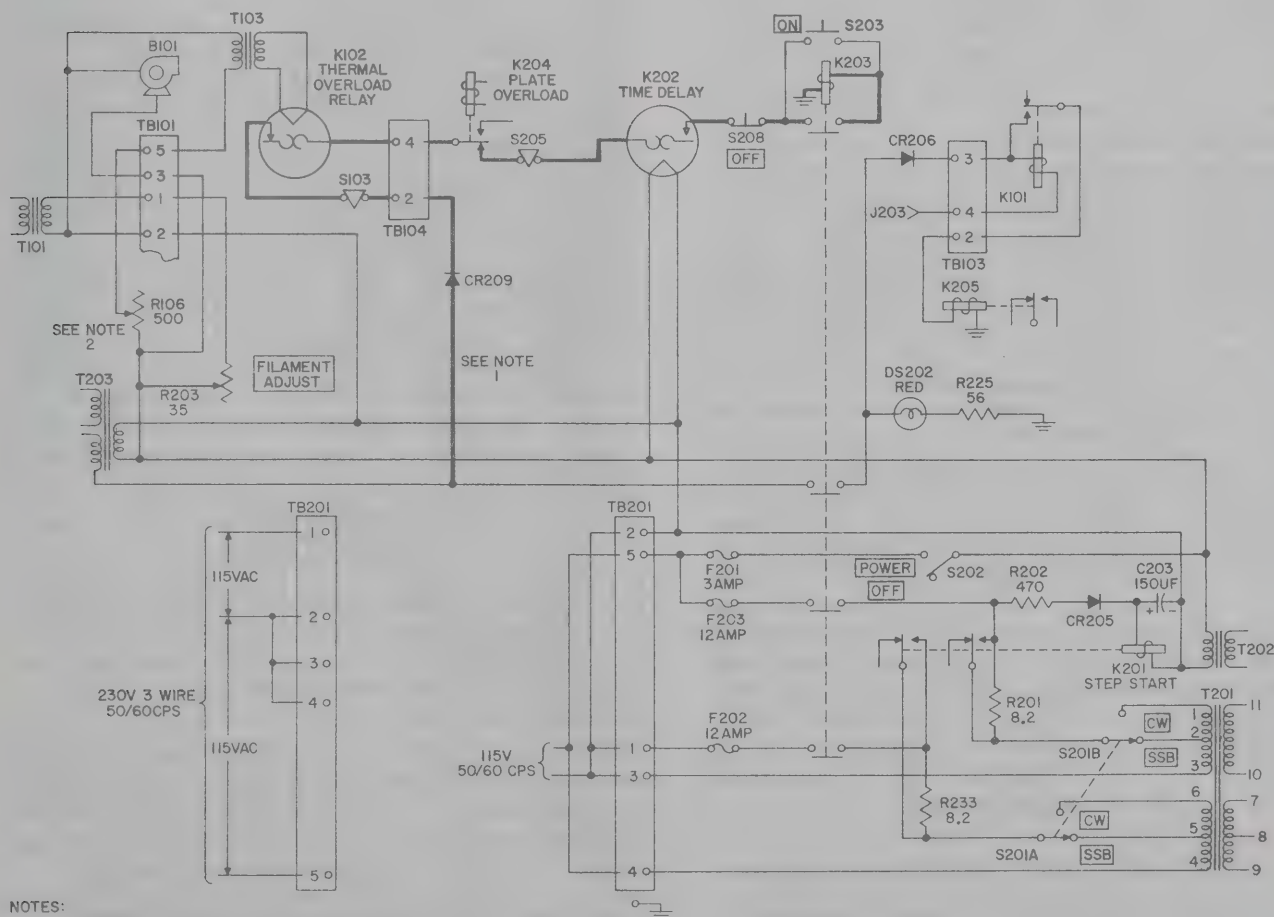
Separate plate, screen, and bias voltage sections and three ac heater sections are included in the



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Figure 8. Connections for 230-Volt Operations

30S-1 power supply. The power supply may be connected to a 115-volt single-phase or a 230-volt, 3-wire, single-phase source. The 230-volt, 3-wire connection is recommended. When only a 2-wire



230-volt source is available, connect a 230-volt to 115-volt autotransformer rated at 750 volt-amperes as shown in figure 8. ALWAYS CONNECT THE 30S-1 TO A LOW-RESISTANCE EARTH GROUND USING THE GROUND CONNECTION ON THE REAR OF THE 30S-1. The high-voltage plate transformer, T201, has two primary windings which are connected in parallel for 115-volt operation, and in series for 230-volt operation. The 12-volt ac winding of bias supply transformer T203 supplies current for the pilot lamps in the two meters and the pilot lamps which light the two dials. This transformer winding also supplies current to be rectified for dc relay power. The bias winding of T203 is connected to CR207 and CR208 in a full-wave rectifier circuit. This circuit provides grid bias voltage for the power amplifier. The heater of the 3-minute time-delay relay is supplied power from the 115-volt ac connections which also furnish power to the high-voltage rectifier filament transformer, T202. Transformer T103 supplies ac power for the heater of the thermal overload relay, K102. Taps on the primary of the high-voltage plate transformer, T201, are switched to provide the different voltages necessary for the power amplifier in CW or SSB operation. Power amplifier bias voltage is taken from the bias supply bleeder resistors for CW or SSB operation. The screen supply rectifiers are eight type 1N1492 silicon diodes in a full-wave bridge circuit. Each rectifier diode is paralleled with a 0.001-uf capacitor to protect it from high transient voltages.

4.5 PROTECTIVE CIRCUITS. (Refer to figure 9.)

4.5.1 SAFETY INTERLOCK CIRCUITS. The top cover and the power supply front door operate safety interlock switches for operator protection. When the top cover is opened, interlock switch S103 breaks the circuit to the coil of the plate contactor, K203. This removes all high voltages from the 30S-1. When the power supply compartment (lower) door is opened, interlock switch S205 breaks the same circuit and removes all high voltages. Both interlock switches are mechanically coupled to shorting switches which short out the high-voltage filter capacitors at the same time the interlock circuit opens. The rf compartment interlock switch, S102, is mechanically coupled to shorting switch S101, and the power supply compartment interlock switch, S205, is mechanically coupled to shorting switch S206. This arrangement protects the operator from accidental contact with approximately 3000 volts dc which is present in either compartment.

WARNING

DO NOT BLOCK interlock switches. Voltages present in this equipment are dangerous to life. Be sure to press the OFF pushbutton before opening cabinet. DO NOT REACH into lower cabinet unless the power cord is disconnected. Line voltage is present at relay K203 regardless of the position of the POWER-OFF switch.

Accidental closing of K203 would apply line voltage to the plate transformer.

4.5.2 TIME DELAY AND STEP-START CIRCUITS.

When POWER-OFF switch S202 is closed, power is applied to the heater of the 3-minute time-delay relay, K202. After the power has been applied to its heater for approximately 3 minutes, the bimetallic contacts close. These contacts are in series with the interlock circuits and the coil of plate contactor K203. When the ON pushbutton is depressed, K203 is energized, contacts of K203 close and apply power to the step-start relay, K201, through dc rectifier CR205. The large electrolytic capacitor across the coil terminals of K201 requires a fixed charging time to rise to a potential high enough to energize the relay. When this time has passed, K201 energizes and shorts out the step-start resistors. Until relay K201 has closed, all power applied to the transformer primary winding has been dropped through the two step-start resistors, R201 and R233. Thus, the high-voltage power supply starts at low primary voltage and, after the step-start cycle has elapsed, switches to full voltage. This allows time for partial charging of the large, high-voltage filter capacitors, C207 and C208, before the application of full secondary voltage to the rectifier plates. During this time, the rectifier tubes are protected from damaging peak currents.

4.5.3 THERMAL AND OVERLOAD CIRCUITS. The thermal overload relay, K102, protects the power amplifier tube from overdissipation and loss of cooling air. Its bimetallic strip has contacts connected in series with the interlock system. The thermal overload switch is located in the air stream from V101. Current from transformer T103 is passed through the heater of K102. This current keeps the temperature of K102 just below that necessary to open its contacts. If the air stream fails, the temperature of the bimetallic strip increases, opening the interlock circuit, and removing voltages from the power amplifier. If overdissipation occurs in the plate of the power amplifier, the higher air temperature causes K102 to open and break the interlock circuit.

CAUTION

Adjustment for proper operating points of K102 are made at the factory. DO NOT ADJUST R106 or alter the contact spacing of K102. Loss of thermal protection of V101 may result.

4.5.4 POWER CONTROL CIRCUITS. Refer to figure 9. When the POWER-OFF switch is operated to POWER position, 115-volt ac power is applied to the filament and control circuits. If the 3-minute time delay of K202 has passed, and if all interlock circuits are in proper operating condition, the plate contactor may be energized by pushing ON switch S203. When K203 contacts close, one set of them holds the electrical connection to the coil and keeps the relay closed after the ON pushbutton is released. Other contacts of K203 supply power to the antenna

changeover relay circuit and to the primary winding of the high-voltage transformer, T201. Power to T201 is applied from K203 contacts through two step-start resistors. These resistors reduce the voltage applied to the transformer until capacitor C203 charges high enough that the voltage across it will energize step-start relay K201. When K201 closes, its contacts short out the step-start resistors and allow full voltage to be applied to the transformer winding.

4.6 ALC AND RF NEGATIVE FEEDBACK CIRCUITS.

Automatic load control is a type of compressor circuit, operating at radio frequencies. The modulation envelope is detected by power amplifier grid rectification. This signal is filtered of rf by L108 and C140 and applied through transformer T102 to alc rectifiers CR217 and CR218 to produce a negative control voltage which is a function of the drive level. The alc rectifiers are connected as a voltage doubler. The negative control voltage produced by the alc rectifiers is fed back to the alc line of the exciter to produce 3 db of override control.

The 3 db of alc override control produced in the 30S-1 reduces the exciter rf gain and keeps the drive level within required limits. Automatic load control helps to keep the drive level low enough to prevent driving the power amplifier into grid current and distortion.

A fixed amount of rf negative feedback, from the output circuit of the power amplifier to the input of the power amplifier, produces a high degree of linearity of the amplified signal. This feedback is accomplished by capacitor C103, which couples some of the plate energy back to the grid circuit. Although there is no phase inversion between the cathode and the plate circuits of a cathode-driven amplifier, there is a phase inversion between the cathode and the grid circuit, providing the grid is not bypassed completely at the rf frequency. Therefore, the feedback voltage is out of phase with the grid voltage. Capacitors C103 and C104 form a voltage divider circuit to maintain the proper amount of feedback voltage.

4.7 TUNING & LOADING METER CIRCUIT.

One section of the SSB-CW switch, S201, selects the proper output voltage from the tuning and loading bridge circuit for the TUNING & LOADING meter indication. This circuit and the power amplifier tube form a specialized bridge circuit. It consists of V101, CR101A, and CR101B, and the associated load resistors and filter networks. The bridge is balanced when the plate circuit TUNING and LOADING controls are set to present the proper load impedance to the power amplifier plate. The meter then will read zero at any power level, and the power amplifier tube will operate at the proper gain level for maximum efficiency and linearity.

4.8 DESCRIPTION OF CONTROLS AND INDICATORS. (Refer to figure 6.)

a. **POWER-OFF.** This switch controls application of ac primary power to the 30S-1. When it is in OFF

position, the 30S-1 is disabled. When it is in the **POWER** position, ac power is applied to filament, control, and indicator circuits (except the "plate on" indicator, DS202).

b. **ON.** When this momentary push switch is pressed, power is applied to the coil of the plate contactor. The plate contactor is held closed by one set of its contacts.

c. **OFF.** This momentary push switch opens the interlock circuit and deenergizes the plate contactor.

d. **BANDSWITCH.** This control selects the desired operating band.

e. **MULTIMETER.** This control selects the desired indication of the MULTIMETER. Refer to table 2 for description of switch positions.

f. **SSB-CW.** This switch selects plate and bias voltages for either SSB or CW operation. It also selects the proper output from the tuning and loading bridge circuit for application to the MULTIMETER.

g. **TUNING.** This control adjusts the plate tuning capacitor. The dial is calibrated in a logging scale.

h. **LOADING.** This control adjusts pi-network loading capacitors C121 and C122. The dial is calibrated in a logging scale.

i. **CALIBRATION CHART.** No calibration chart is provided on the front panel or in this instruction book. Such a chart must be derived for the conditions involved in a particular antenna and feed system. The operator can make a chart for his particular system, using the logging scales on the TUNING and LOADING controls.

5. Maintenance.

5.1 **GENERAL.** No special test equipment is required for adjustment of the input rf circuits if the station includes an rf wattmeter and directional coupler such as are included in the 312B-4 Station Control. If it is necessary to adjust the loading indication of the multimeter, required test equipment includes a 2500-watt, noninductive dummy load and a 2-tone audio oscillator (750 and 1900 cps).

CAUTION

If any replacements are made in input circuits, be sure to retain the 6.1-foot coaxial lead between S102A and L110. This critical length of cable is part of the matching network.

5.2 **BLOWER LUBRICATION.** Every 1000 hours of operation (approximately 6 months of normal use), lubricate the blower motor bearings with a few drops of lightweight oil. Sewing-machine oil is adequate. Do not overlubricate. Figure 14 shows the oil-hole locations.

5.3 ALIGNMENT OF RF INPUT CIRCUITS.

5.3.1 AMATEUR BANDS.

a. Connect a directional wattmeter (such as the type used in the 312B-4 Station Control or 302C-3

Directional Coupler) between the exciter output and RF INPUT jack J201 on the 30S-1. Connect a 2500-watt, noninductive 50-ohm dummy load to the output of the 30S-1.

b. With the 30S-1 plate power off, tune the exciter to 3.6 mc (if CW operation only is anticipated), 3.8 (if both CW and phone operation is anticipated), or 3.9 mc (if phone operation only is anticipated).

c. With the 30S-1 SSB-CW switch in the SSB position, press the ON pushbutton. Tune and load the 30S-1 into the dummy load. Retune and load the exciter output as necessary to maintain a 50-watt exciter power output.

d. While monitoring the directional wattmeter installed in step a above, adjust L114 (accessible through one of the holes in the top cover of the rf compartment) for minimum reflected power (not to exceed 2 watts).

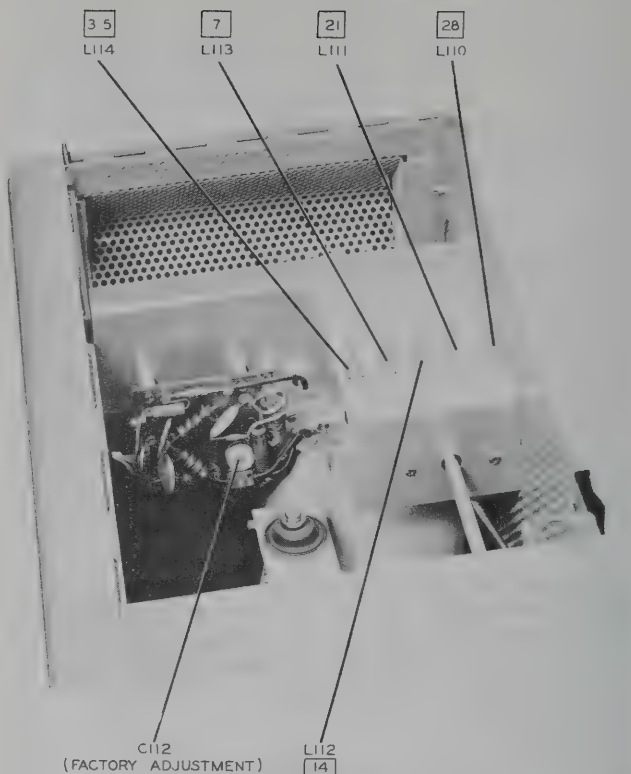
e. Repeat the above procedure at 7.2, 14.3, 21.3, and 28.6 mc, adjusting L113, L112, L111, and L110 respectively. These adjustments are accessible through the holes in the top cover of the rf compartment. Do not raise the rf compartment cover for this procedure.

5.3.2 GENERAL COVERAGE. Use the same procedure as given in paragraph 5.3.1, except set exciter to a frequency which is in the middle of the desired band. Useful bandwidth at the new alignment frequencies is approximately the same as that for the amateur bands. Do not attempt alignment to place the new operating bands outside the ranges given in table 3 for the BANDSWITCH positions listed. Also, do not attempt amateur-band operation on a BANDSWITCH position when the tuned circuits for that position have been realigned for out-of-band operation.

TABLE 3. FREQUENCY COVERAGE ALLOWABLE BY REALIGNMENT

BANDSWITCH SETTING	LOWER LIMIT	UPPER LIMIT
3.5	3.4 mc	6.0 mc
7	6.0 mc	10.0 mc
14	10.0 mc	15.0 mc
21	15.0 mc	22.0 mc
28	20.0 mc	30.0 mc

5.4 BIAS AND FILAMENT VOLTAGE ADJUSTMENT. Occasionally check the FILAMENT VOLTAGE reading on the MULTIMETER and the no-signal plate current on the PLATE CURRENT meter. If



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Figure 10. Input Tuned Circuit Adjustment Locations

these readings are not 6.0 volts ac and 200 ma dc, respectively, adjust as in paragraph 2.1.

5.5 LOADING INDICATOR ADJUSTMENT. The loading indicator circuit may be checked for accuracy as follows:

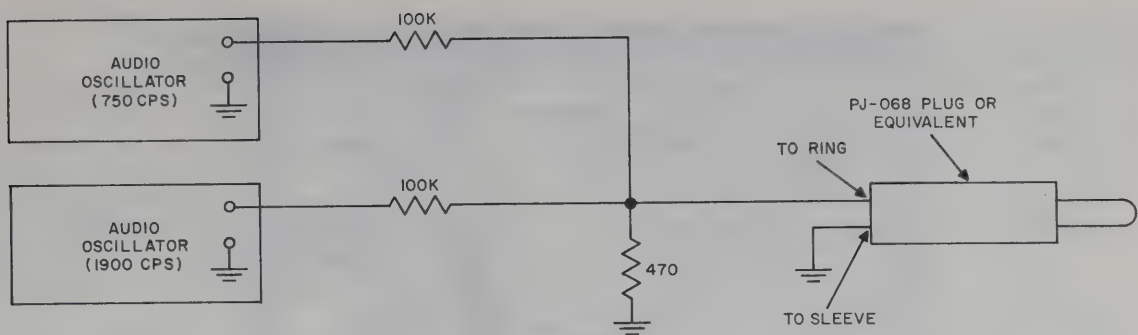
a. Connect a 50-ohm, 2500-watt, noninductive dummy load to RF OUTPUT connector J103 on the rear of the 30S-1.

b. Tune and load the 30S-1 at 14.3 mc (SSB).

c. Introduce a 2-tone input signal (750 and 1900 cps) to the exciter input. When using the KWM-2/2A or S-line equipment, this can be done as shown in figure 11, where one audio oscillator is generating a 750-cps 1-volt rms signal and the other is generating a 1900-cps 1-volt rms signal.

d. Adjust the exciter for an USB signal of approximately 30 watts rf output using the 2-tone signal for the exciter drive. When using the KWM-2/2A or S-line equipment, this is done by positioning the METER switch to the ALC position and turning the MIC GAIN control clockwise until an indication of 6 db is indicated on the meter.

e. Set the 30S-1 MULTIMETER switch to the TUNING & LOADING position. Adjust the 30S-1 TUNING and LOADING controls for maximum power output. If the



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Figure 11. 2-Tone Test Setup

meter indication is not 0, adjust C112 until the meter indication is 0.

f. Remove the drive to the 30S-1 (when using the KWM-2/2A or S-line equipment, merely turn the MIC GAIN control fully counterclockwise) and push the OFF pushbutton on the 30S-1. Remove the 2-tone input signal. Set the 30S-1 multimeter switch to the GRID position. Increase the exciter drive level to produce a 30S-1 current indication of 0.2 ma (when using the KWM-2/2A or S-line equipment, increase the drive by positioning the mode selector to the LOCK KEY position and then positioning the MIC GAIN control clockwise to the desired drive level).

g. Set the 30S-1 MULTIMETER switch to the TUNING & LOADING position. Adjust the TUNING control to produce a dip in the multimeter indication. Adjust the LOADING control for a peak PLATE CURRENT meter indication. Continue adjusting the TUNING control for a multimeter dip and the LOADING CONTROL for a PLATE CURRENT meter peak until the PLATE CURRENT meter indicates 480 ma and the MULTIMETER indicates 0.

h. If the multimeter indication in step g is not satisfactory, adjust R105 until the MULTIMETER indication is 0.

5.6 POWER OUTPUT CHECK.

a. Connect a 50-ohm, 2500-watt noninductive dummy load to the RF OUTPUT connector J103 on the rear of the 30S-1.

b. Connect an rf vacuum-tube voltmeter across the dummy load, setting the range scale on the meter to read approximately 300 volts of rf.

c. Tune and load the 30S-1 on any frequency in the CW mode. The rf vtm across the dummy load should indicate at least 173 volts.

CAUTION

During the above procedure, do not keep the 30S-1 operating at output power levels higher than 600 watts for long periods of time. The power supply is not designed for continuous high power operation.

For SSB operation, the average voice has a peak-to-average power ratio of approximately 15 db. The alc circuits of the equipment reduce this ratio to approximately 10 db for the average operator. This means that the average power read on the wattmeter is about 10 percent of the peak power output. If the operator's voice is low pitched, the average power indicated on the wattmeter will be higher. However, since the alc circuits of the equipment reduce the drive power when the amplifier reaches 2-kw plate power input, indication of alc voltage on voice peaks means that the 30S-1 is operating at its optimum power output level.

5.7 DIAL CORD REPLACEMENT. Refer to figures 12 and 13. Remove all control knobs. Remove the flat-head screws securing the front panel to the cabinet. These screws are arranged across the top front and bottom front edges of the cabinet. The power supply front cover must be removed to gain access to the bottom screws. Do not loosen the screws at the sides of the cabinet. Remove the front panel from the cabinet, exposing subpanel and dial drive assemblies. Remove the broken or defective dial cord, and replace with the proper length of the new cord (Collins part number 432-1009-00). When ordering dial cord, be sure to state the desired length in feet. If possible, measure the required length of the new cord to be

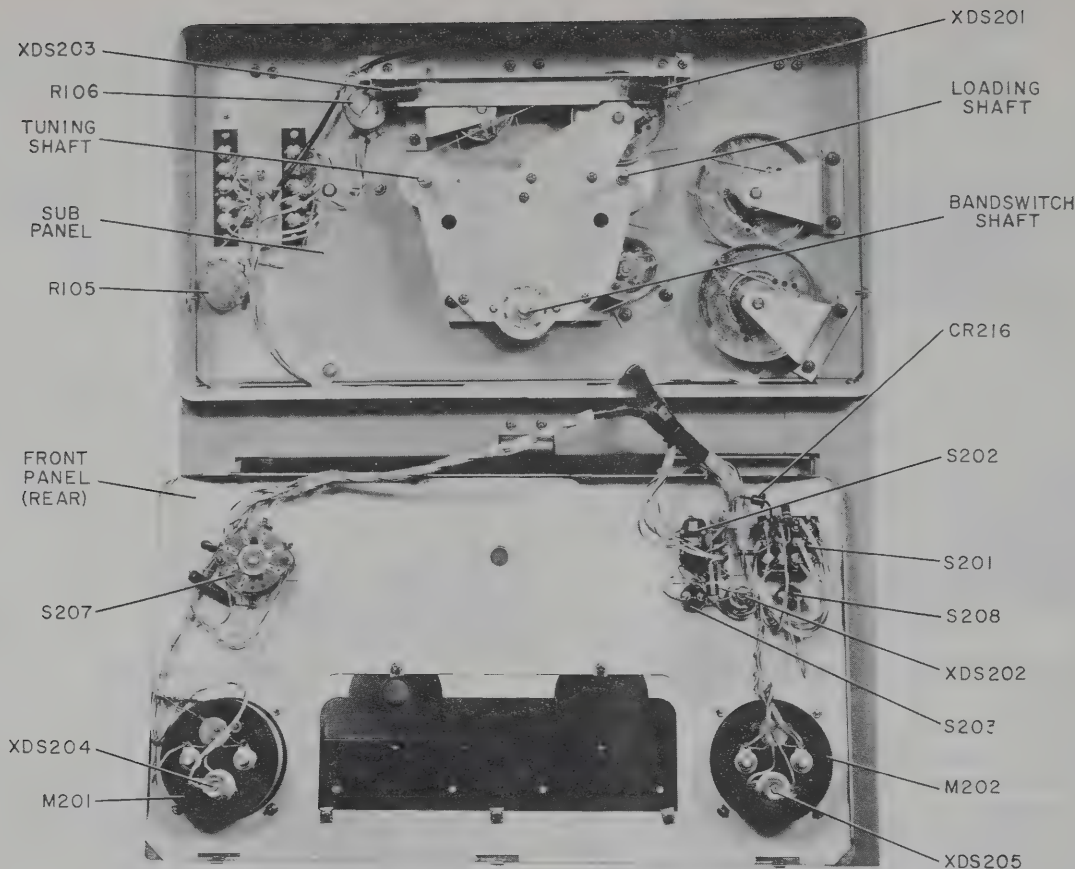


Figure 12. 30S-1, Front Panel Lowered and Subpanel Exposed

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ut by the length of the old cord removed. Note that switch drive cords are not under spring tension. These cords are pulled and tied tight in order to bring switches into positive detent. Replace front panel and knobs. If switches are not aligned to same relative positions after the dial cord replacement, loosen the shaft couplers and align switches and knobs to proper positions. Retighten couplers.

8 PA TUBE REPLACEMENT. If it is necessary to replace the power amplifier tube, V101, proceed carefully as follows:

a. Move K102 aside as shown on 30S-1 lid so it will not interfere in tube removal or replacement.
b. Loosen the clamp around the tube plate cooling fins. Do not move the tube clamp out of position.
c. Grasp the tube by the plate cooling fins, and gently rotate tube one-third turn counterclockwise. Pull the tube straight out from its socket. Do not force at any time, but feel for binding or interference as the tube is withdrawn. Inspect the connector tabs inside the socket to make sure they were not deformed in tube removal.

d. Remove the new tube from its carton. Inspect it to be certain that the base contacts have not been damaged in shipping. These contacts are the thin metal tabs which extend radially from the ceramic lower portion of the tube.

e. Insert the tube GENTLY into its socket, making certain the tube base contacts are not jammed or bent in the process. In order to do this, start the socket key into the keyway inside the tube and lower the tube gently, feeling for any binding between socket key and tube keyway. If binding occurs, withdraw the tube, rotate it one-third turn and try again. In two of the three possible positions, the tube may bind in entering the socket. This is due to the fact that the tube keyway and the socket key are slightly off center. Find the orientation which does not bind, and insert the tube all the way into the socket so that the bottom portion of the tube plate cooling fins is inside the black cooling chimney.

f. Check that the top of the tube plate cooling fins is approximately seven-eighths inch above the top edge of the black cooling chimney. Turn the tube clockwise (viewed from 30S-1 rear) against the stop to tighten the tube base contacts under the socket contacts. DO NOT FORCE.

CAUTION

If an attempt is made to force the tube into its contacts when the tube is not properly seated in its socket, both tube and socket may be damaged. The warranty for tube and socket is void for damage caused by improper handling or installation.

g. Tighten the clamp around the tube plate cooling fins. This makes electrical connection to the plate of the tube.

h. Place the thermal relay, K102, so that its detent is engaged, and it will be in the air stream flowing through the cooling fins of the tube.

CAUTION

Be sure that K102 does not touch the top of the tube. This would cause a damaging short circuit.

Refer to figure 14 which shows the power amplifier tube properly installed and the proper operating position of K102. Inspect the rf compartment to be sure there are no short circuits, and close the top cover.

5.9 PILOT LAMP REPLACEMENT. The "plate on" indicator lamp may be replaced without removing the front panel. The red and black jewel which covers this lamp snaps onto the panel. It is shown in figure 6 as the PILOT LAMP (7). Grasp the jewel and snap it off. Replace the bulb (DS202), and snap the jewel back in place. The meter and dial lamps may be replaced by removing the front panel. To replace these lamps, proceed as follows:

- a. Remove all control knobs. Remove the power supply front cover.
- b. Remove the flathead screws securing the front panel to the cabinet.

NOTE

Do not loosen any screws at the sides of the cabinet. The front panel is secured only by screws along the top and bottom edges.

c. Pull the front panel out and allow it to hang by its cable. Refer to figure 12.

d. To replace the dial lamps, slip their clip-on sockets off the ends of the bracket which is mounted above the dials. Replace the dial lamps and slip the clip-on sockets back on the bracket. Refer to figure 12.

e. To replace a meter lamp, pull the socket straight out from the meter case. Replace the lamp in the socket and snap the socket back into the hole in the meter case.

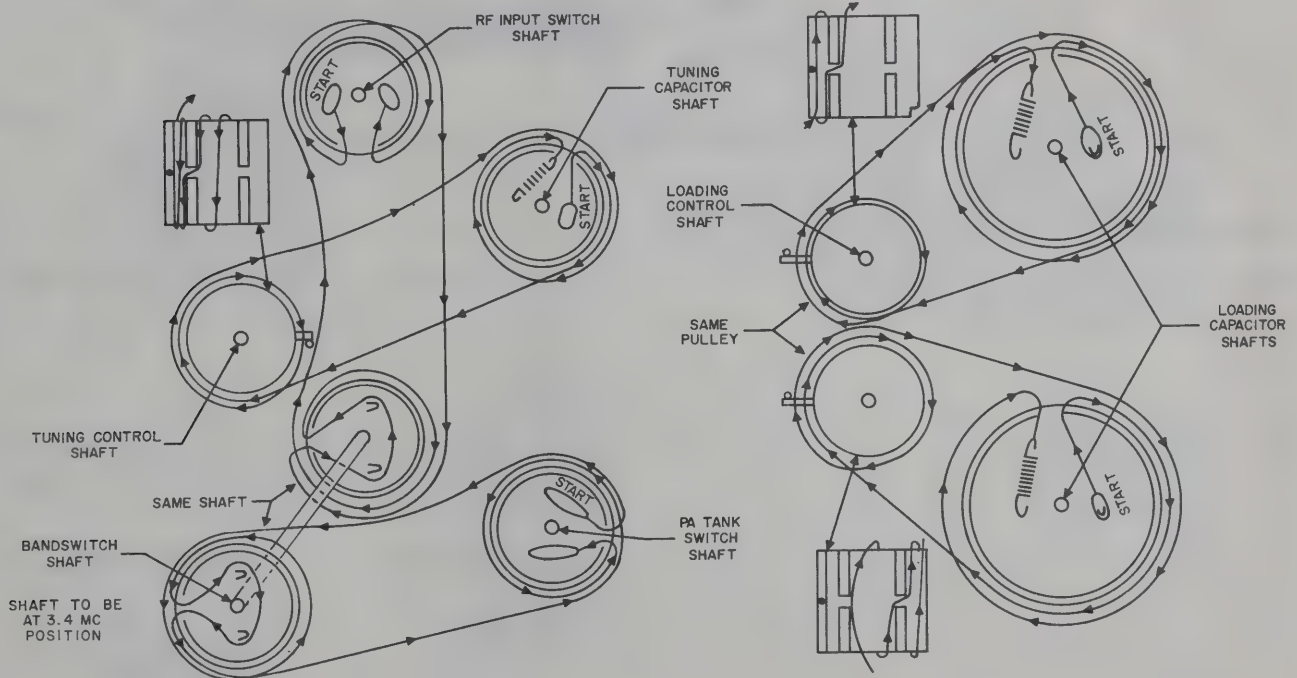


Figure 13. Dial Cord Replacement Diagram

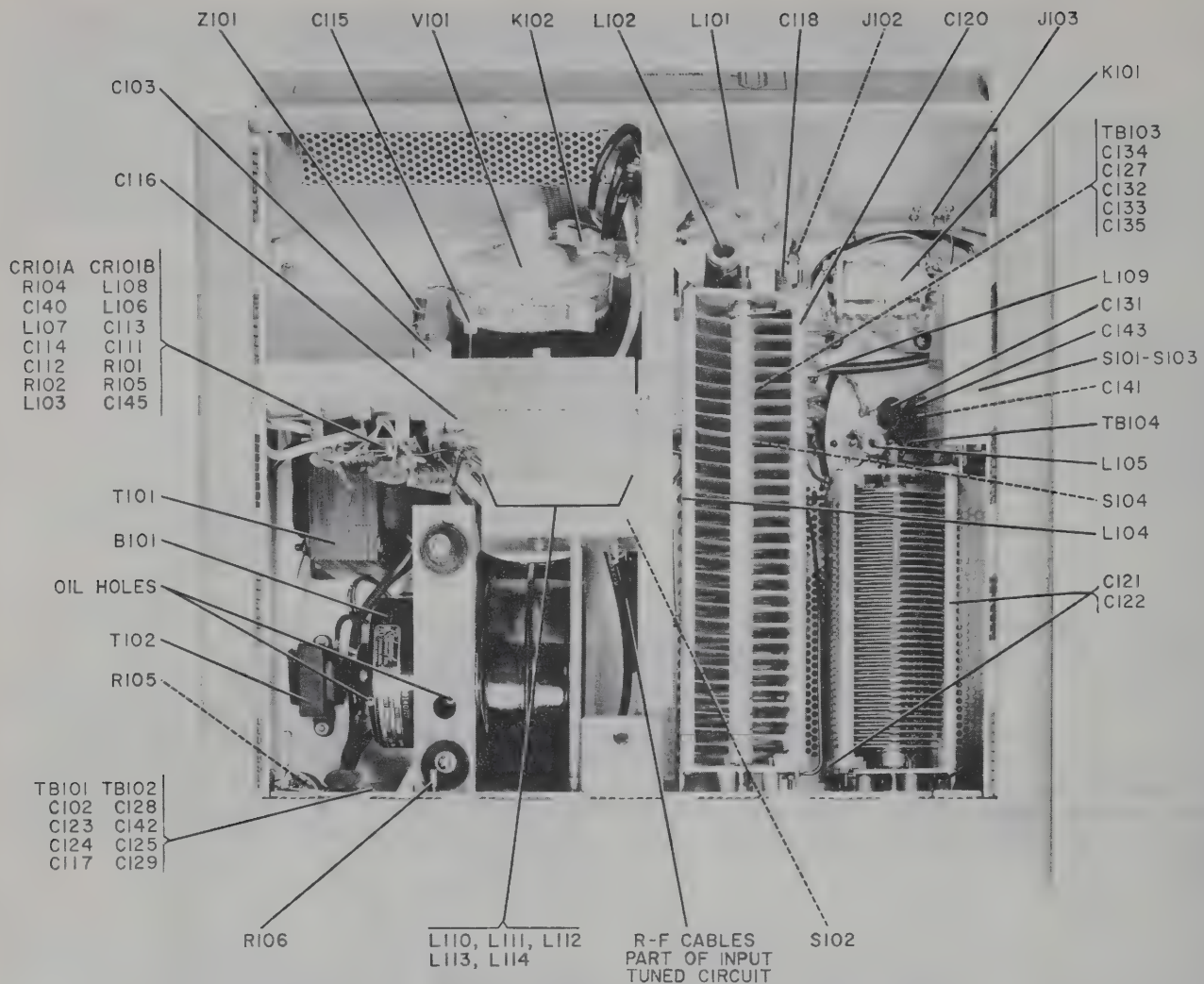


Figure 14. Power Amplifier Compartment, Parts Location

C432-09-P

6. Specifications.

Size 30-5/8 in. high, 17 in. wide, 18-3/4 in. deep (overall dimensions).

Weight 160 pounds.

Frequency range 3.5 mc - 29.7 mc, covering all amateur bands. By retuning input coils as necessary, the following general coverage bands may be covered:

Frequency Band	Total Coverage
3.5 mc	3.5 - 6.0 mc
7.0 mc	6.0 - 10.0 mc
14.0 mc	10.0 - 15.0 mc
21.0 mc	15.0 - 22.0 mc
28.0 mc	22.0 - 30.0 mc

Mode SSB or CW.

Type of service Intermittent commercial or amateur.

Plate power input CW - 1000 watts input.
SSB - Nominal average input of 1000 watts with
speech. Distortion products at this level are at
least 30 db down from signal.

Drive power requirements SSB - 80 watts pep. nominal.
CW - 60 watts nominal.

Primary power requirements 230 volts ac, 3-wire, single-phase, at 15 amperes
or 115 volts ac at 30 amperes.

Input impedance 52 ohms.

Output impedance 52 ohms nominal unbalanced with swr not to exceed
2 to 1.

Noise level. 40 db down from output signal with 1-kw single-tone
input.

Harmonic output All harmonics at least 45 db down from output
signal.

Vacuum tubes PA - 4CX1000A (1).
Rectifiers - 3B28 (2).

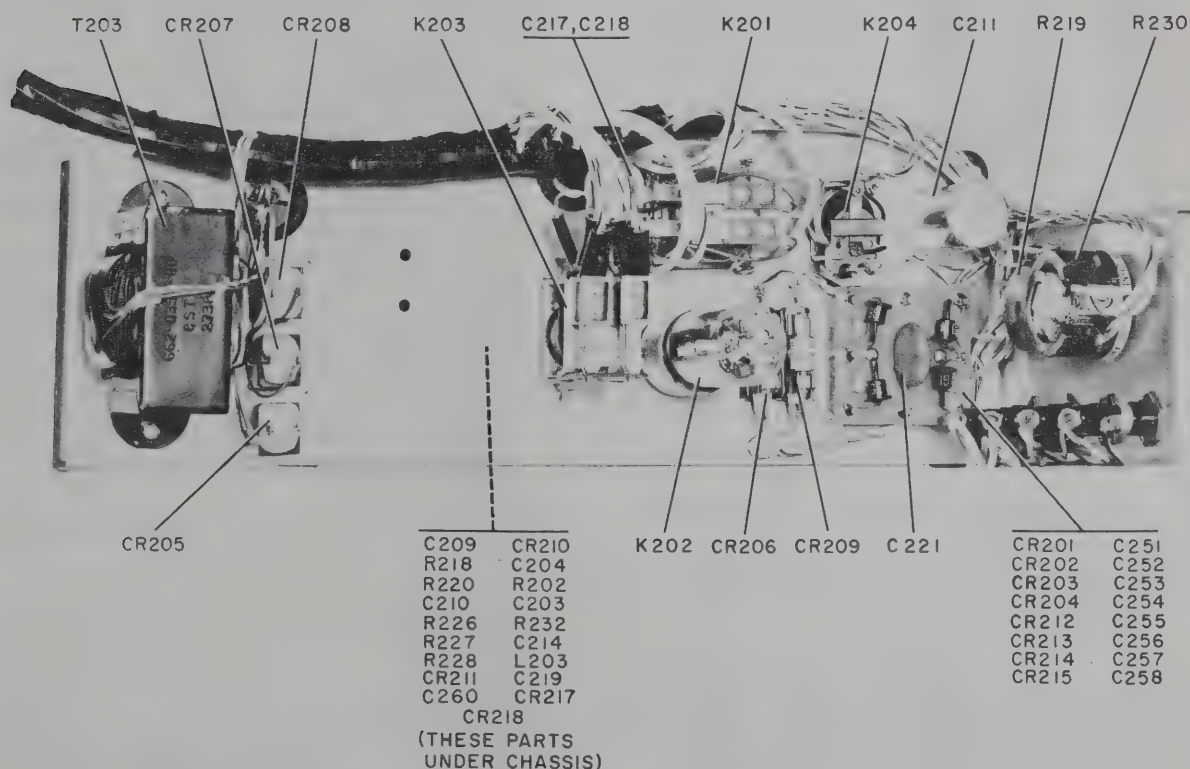


Figure 15. Relay Shelf in Power Compartment, Parts Location

C432-10-P

7. Parts List.

Figures 4, 5, 10, 12, 14, and 15 show parts identification of the 30S-1. Following is a parts list for the 30S-1.

ITEM	DESCRIPTION	COLLINS PART NUMBER
30S-1 POWER AMPLIFIER		522-1286-00
UPPER CABINET		544-6873-00
B101	BLOWER: direct connected; 115 v ac, 60 cps, single phase, 0.30 amp, 1550 rpm; Redmond Co., Inc. part no. L-30122	009-1407-00
C101	NOT USED	
C102	CAPACITOR, FIXED, CERAMIC: 10,000 uuf $\pm 20\%$, 500 v dc; Sprague Electric Co. of Wisconsin	913-3013-00
C103	CAPACITOR, FIXED, CERAMIC: 5 uuf $\pm 5\%$, 5000 vdcw; Centralab Division of Globe Union, Inc. part no. 850S5ZPORM5PCT	913-0840-00
C104	CAPACITOR, FIXED, CERAMIC: 220 uuf $\pm 5\%$, 1000 vdc; Centralab	913-3538-00
C105	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C106	NOT USED	
C107	CAPACITOR, FIXED, CERAMIC: 91 uuf $\pm 5\%$, 1000 vdc; Centralab	913-3579-00
C108	CAPACITOR, FIXED, CERAMIC: 110 uuf $\pm 5\%$, 1000 vdc; Centralab	913-3572-00
C109	CAPACITOR, FIXED, CERAMIC: 510 uuf $\pm 5\%$, 1000 vdc; Centralab	913-3585-00
C110	CAPACITOR, FIXED, CERAMIC: 820 uuf $\pm 5\%$, 1000 vdc; Centralab	913-3586-00
C111	CAPACITOR, FIXED, MICA: 5 uuf $\pm 10\%$, 500 v dc; Electro Motive Mfg. Co. part no. DM15C050K-500WV	912-2751-00
C112	CAPACITOR, VARIABLE, CERAMIC: rotary type, 1 section, 8 to 75 uuf, 350 v dc; Erie Resistor Corp. part no. 557018 U2PD 34R	917-1075-00
C113	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C114	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C115	CAPACITOR, FIXED, CERAMIC: 1 uuf $\pm 25\%$, 5000 v dc; Centralab type DA855	913-3703-00
C116	CAPACITOR, FIXED, CERAMIC: 150 uuf $\pm 10\%$, 500 vdc; Centralab type 721	914-3705-00
C117	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C118	CAPACITOR, FIXED, CERAMIC: 1000 uf $\pm 20\%$, 5000 v dc; Centralab Division of Globe Union, Inc. part no. DA858-003	913-0101-00
C119	NOT USED	
C120	CAPACITOR, VARIABLE, AIR: plate meshing type; 32 uuf min. to 241 uuf max; E.F. Johnson part no. 154-16	920-0137-00
C121	CAPACITOR, VARIABLE, AIR: plate meshing type; 29 uuf min. to 700 uuf max.; E.F. Johnson part no. 154-32	920-0140-00
C122	CAPACITOR, VARIABLE, AIR: same as C121	920-0140-00
C123	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C124	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C125	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C126	NOT USED	
C127	CAPACITOR, FIXED, CERAMIC: 0.0015 uf $\pm 20\%$, 6000 v dc; Centralab type DD60	913-3539-00
C128 thru C133	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C134	CAPACITOR, FIXED, MICA: 33 uuf, $\pm 10\%$, 500 v dc; Electro Motive p/n DM15F330K01	912-2781-00
C135	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C136	NOT USED	
C137	CAPACITOR, FIXED, CERAMIC: same as C107	913-3579-00
C138	CAPACITOR, FIXED, CERAMIC: 180 uuf $\pm 5\%$, 1000 vdc; Centralab	913-3581-00
C139	CAPACITOR, FIXED, CERAMIC: 220 uuf $\pm 5\%$, 1000 vdc; Centralab	913-3582-00
C140	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C141	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C142	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C143	CAPACITOR, FIXED, CERAMIC: same as C127	913-3539-00
C144	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C145	CAPACITOR, FIXED, CERAMIC: same as C102	913-3013-00
C146	CAPACITOR, FIXED, CERAMIC: 1000 uuf $\pm 20\%$, 500 v dc; Erie Resistor Corp. part no. 327047 X5T0 102Z	913-1292-00
C147	CAPACITOR, FIXED, CERAMIC: 650 uuf $\pm 5\%$, 1000 v dc; Centralab Division of Globe Union, Inc. part no. DA135-022CB	913-3588-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
C148	CAPACITOR, FIXED, CERAMIC: same as C146	913-1292-00
C149	CAPACITOR, FIXED, CERAMIC: same as C146	913-1292-00
C150	CAPACITOR, FIXED, CERAMIC: 560 uuf $\pm 5\%$, 1000 vdc; Centralab Division of Globe Union, Inc. part no. DA136-019CB	913-3589-00
C151	CAPACITOR, FIXED, CERAMIC: same as C150	913-3589-00
CR101A	SEMICONDUCTOR DEVICE, DIODE: germanium; hermetically sealed; Hughes Aircraft part no. HD2120	353-2780-00
CR101B	SEMICONDUCTOR DEVICE, DIODE: same as CR101A	353-2780-00
J101	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation; brass contacts; Howard B. Jones Division of Cinch Mfg. Corp. part no. 201-11-01-018	360-0088-00
J102	JACK, TIP: same as J101	360-0088-00
J103	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 rd female contact; 1 mating end; 30 ohms; Communication Electronic Nomenclature Subpanel part no. UG-58A/U	357-9003-00
K101	RELAY, ARMATURE: 2C, 10 amp, 115 vac or 26.5 vdc; 55 ohms coil; Elgin National Watch Co. part no. AH1000	970-1922-00
K102	SWITCH, THERMAL: bimetal element	545-3120-004
L101	COIL, RADIO FREQUENCY: silver plated copper wire 1/8 in. dia; 3 turns, 15/16 in. id; 2 in. lg approx	544-6950-002
L102	COIL, RADIO FREQUENCY: 159 turns, single layer wound no. 27 AWG wire	540-7979-00
L103	COIL, RADIO FREQUENCY: single layer wound solenoid, 56 uh inductance, 870 ma cur; 1.30 ohms; Jeffers Electronics Division of Speed Carbon Co. part no. 10404-30	240-0191-00
L104	COIL, TUNING: soldered	545-7604-003
L105	COIL, RADIO FREQUENCY: single layer wound; 44 uh 600 ma; 7 mc to 35 mc; Parker Kalon Division of General American Transportation Corp. part no. 49966	240-0137-00
L106	COIL, RADIO FREQUENCY: universal wound; 2 mh inductance, 100 ma cur; 50,000 ohms, National Coil Co. part no. C-0047409	240-0134-00
L107	COIL, RADIO FREQUENCY: same as L106	240-0134-00
L108	COIL, RADIO FREQUENCY: same as L106	240-0134-00
L109	COIL, RADIO FREQUENCY: silver plated copper tubing 3/16 in. dia; 5 turns, approx 2-1/8 in. lg	544-6900-002
L110	COIL, RADIO FREQUENCY: 5 turns, single layer wound no. 20, single strand formvar 0.28-0.45 uh	544-6999-003
L111	COIL, RADIO FREQUENCY: 6 turns, single layer wound, no. 20, single strand formvar 0.7-1.1 uh	544-6998-003
L112	COIL, RADIO FREQUENCY: 7 turns, single layer wound, no. 20, single strand formvar 0.7-1.1 uh	544-7002-003
L113	COIL, RADIO FREQUENCY: 11 turns, single layer wound, no. 20, single strand formvar 1.1-1.7 uh	544-7001-003
L114	COIL, RADIO FREQUENCY: 19 turns, single layer wound, no. 22, single strand formvar 1.9-3.1 uh	544-7000-003
L115	COIL, RADIO FREQUENCY: 11 turns of #20 AWG, 1.8 mh $\pm 5\%$	545-7814-00
L116	COIL: p/o Z101	
MP101	PULLEY: steel, 1 "U" shaped groove, 1.625 in. od; brass hub 1/4 in. id	544-6949-002
MP102	DRUM, LOADING, PRESSED: aluminum; 0.250 in. id by 1-5/8 in. od by 1 in. lg; incl 1 pin spring 1/2 in. lg	544-6962-002
MP103	DRUM, TUNING, PRESSED: aluminum, 0.250 in. id, 1-3/8 in. od, 7/8 in. lg, incl 1 pin spring 1/2 in. lg	544-6964-002
MP104	PULLEY: steel, 1 "U" shape groove; 1.625 in. od; 1 brass hub, 0.188 in. id	544-6899-002
MP105	PULLEY: steel, 1 "U" shape groove; 0.375 in. id by 2.125 in. od by 1/4 in. thk; Gray Stamping and Mfg. Co. part no. SP3-22	281-0054-00
MP106	PULLEY: steel, 1 "U" shape groove; 0.375 in. id, by 3 in. od by 11/32 in. thk; Gray Stamping and Mfg. Co. part no. SP4-28	281-0019-00
MP107	PULLEY: same as MP106	281-0019-00
MP108	PULLEY: same as MP101	544-6949-002
P101	PLUG, TIP: small banana contact element; plastic insulation; nonprecious metal contact; 1.250 in. lg o/a; Switchcraft, Inc. part no. 3501MC	361-0062-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
P102	PLUG, TIP: same as P101	361-0062-00
R101	RESISTOR, FIXED, FILM: 38,300 ohms $\pm 1\%$, 1/4 w; IRC type MDB	705-7172-00
R102	RESISTOR, FIXED, FILM: same as R101	705-7172-00
R103	RESISTOR, FIXED, COMPOSITION: 22 ohms $\pm 10\%$, 1 w; Allen Bradley type GB	745-3282-00
R104	RESISTOR, FIXED, COMPOSITION: 1000 ohms $\pm 10\%$, 1 w; Allen Bradley type GB	745-3352-00
R105	RESISTOR, VARIABLE: 0.10 megohms $\pm 20\%$, 1/2 w; Stancor Electronics, Inc.	376-3275-00
R106	RESISTOR, VARIABLE, WIREWOUND: 500 ohms $\pm 10\%$, 2 w; Chicago Telephone Supply Corp.	750-0510-00
S101	INTERLOCK ASSEMBLY UPPER: c/o the following SPRING, HELICAL COMPRESSION: cres wire, 1 5/8 in. free length SHAFT: cres, 1/4 in. dia by 4 1/16 in. lg DISC, SHORTING: brass, 1/16 in. thk, 0.406 in. id, 3/4 in. radius INSULATOR, SWITCH: phenolic, 0.255 in. id, 3/4 in. radius, 3/16 in. thk COLLAR: aluminum, setscrew type, 0.250 in. id, 1/2 in. od BRACKET: aluminum, 0.064 in. thk, 1 1/4 in. by 2 3/16 in. by 4 in., three clinch nuts 4-40 pressed into bracket	544-6879-00 544-6922-002 544-6924-002 544-6925-002 544-6926-002 544-6967-002 544-6990-003
S102	SWITCH SECTION, ROTARY: 1 moving contact, 7 fixed contacts, 1 pole, phenolic insulation; Oak Mfg. Co. part no. 94111AH	269-2036-00
S103	SWITCH, PUSH: spst, solder lug, tinned, 125 vac at 0.75 amp, 250 v ac at 0.25 amps; 0.312 in. by 0.675 in. by 1.956 in.; Cutler Hammer, Inc. part no. 8411K4	260-2548-00
S104	SWITCH, ROTARY: 1 moving contact, 1 pole, 4 fixed contacts	545-7825-003
T101	TRANSFORMER, POWER, STEP-DOWN: open frame, primary winding 105 v, 50/60 cps, second- ary winding, 6 v, 12.5 A wire leads; Stancor Electronics, Inc.	662-0354-00
T102	TRANSFORMER, AUDIO FREQUENCY: pri. 10,000 ohms, 0 amp; sec. 10,000 ohms, 0 amp; Stancor Electronics Inc. part no. 27658	667-0344-00
T103	TRANSFORMER, POWER, STEP-DOWN: primary winding 0.5 v; 50 to 60 cps, 7 amps; Stancor Electronics, Inc. part no. 28618	662-0427-00
TB101	TERMINAL BOARD: bakelite; 1/16 in. thk, 5/8 in. w, 3 in. lg; 5 screw-type terminals; Cinch Mfg. Corp. part no. 1775	306-0035-00
TB102	TERMINAL BOARD: same as TB101	306-0035-00
TB103	TERMINAL STRIP: bakelite; 1/16 in. thk., 5/8 in. w, 2-9/16 in. lg; 4 terminals; Cinch Mfg. Corp. part no. 1774	306-0034-00
TB104	TERMINAL STRIP: same as TB103	306-0034-00
TB105	TERMINAL BOARD: plastic; 1/16 in. by 2 5/16 in. by 2 5/16 in.	544-6970-002
V101	ELECTRON TUBE: tetrode; Eimac type 4CX1000A; Eitel-McCullough, Inc. part no. 4CX1000A	256-0123-00
XV101	SOCKET, ELECTRON TUBE: use with tube type 4CX1000A; Eimco Corp. part no. Y-131	220-1341-00
Z101	SUPPRESSOR, PARASITIC: 2 turns of no. 20 AWG wire inductance, 22 ohms resistance, 1 w, incl L116 DIAL CABLE: plastic covered; c/o 0.012 in. dia, 7 strand stainless steel cable, coated w/ nylon to 0.032 in. dia; Berkley Fly Co. part no. NON5	544-6876-00 432-1009-00
LOWER CABINET AND FRONT PANEL		544-6874-00
C201	CAPACITOR, FIXED, CERAMIC: 10,000 uuf $\pm 20\%$, 500 v dc; Sprague Electric Co. of Wisconsin	913-3013-00
C202	CAPACITOR, FIXED, CERAMIC: same as C201	913-3013-00
C203	CAPACITOR, FIXED, ELECTROLYTIC: 150 uf -10% $+100\%$, 150 v dc; Sprague Electric Co. part no. D29075	183-1560-00
C204	CAPACITOR, FIXED, ELECTROLYTIC: 40 uf -10% $+100\%$, 350 v dc; Sprague Electric Co. part no. D29076	183-1559-00
C205	CAPACITOR, FIXED, PAPER ELECTROLYTIC: 0.5 uf $\pm 20\%$, 1500 vdc; Sprague Electric part no. CP70E1EH504K1	962-4309-00
C206	CAPACITOR, FIXED, PAPER: 0.15 uf $\pm 10\%$, 5000 vdc; Cornell-Dubilier	930-0035-00

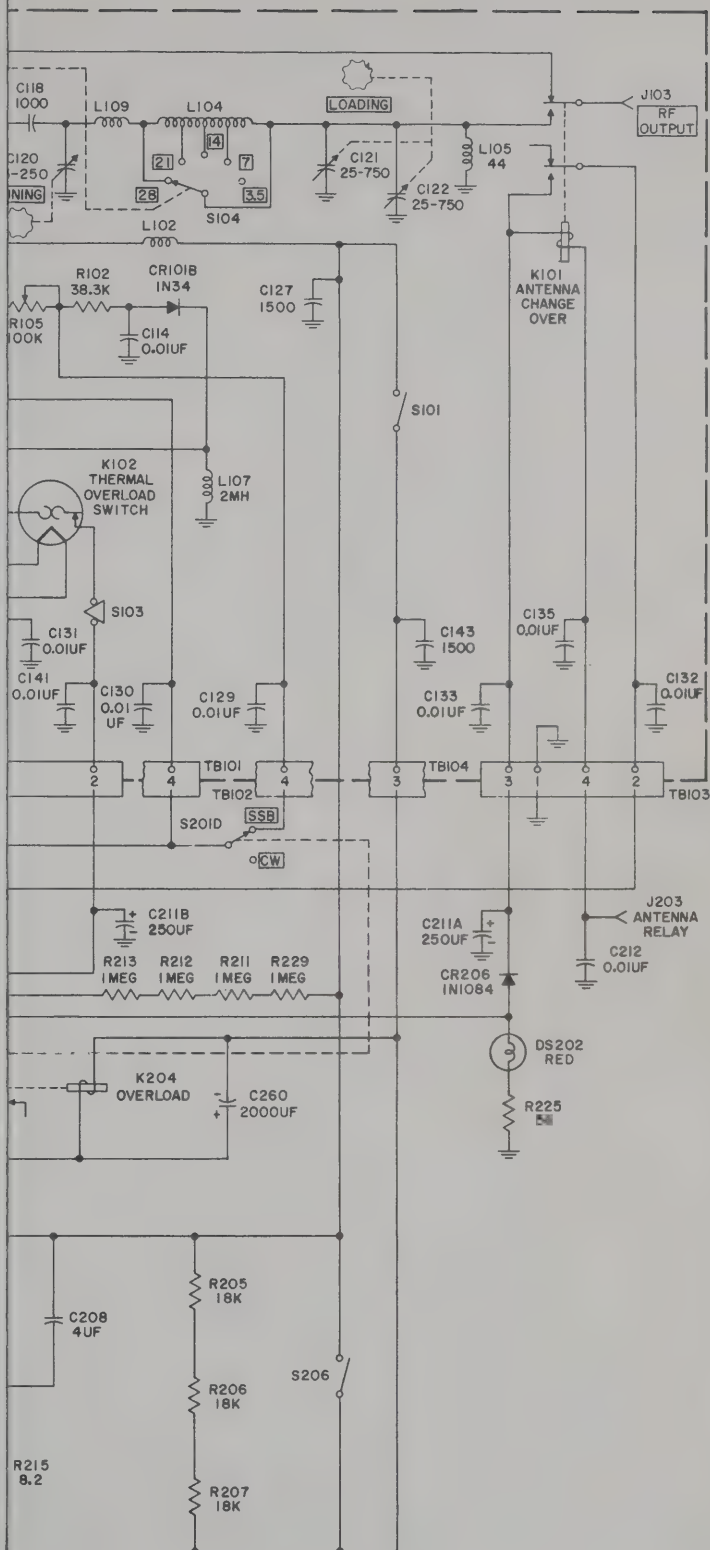
ITEM	DESCRIPTION	COLLINS PART NUMBER
C207	CAPACITOR, FIXED, PAPER: 4 uf $\pm 20\%$, 3000 v dc; Cornell-Dubilier	930-4314-00
C208	CAPACITOR, FIXED, PAPER: same as C207	930-4314-00
C209	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf -10% $+100\%$, 150 v dc; P.R. Mallory no. TC49	183-1045-00
C210	CAPACITOR, FIXED, ELECTROLYTIC: same as C209	183-1045-00
C211	CAPACITOR, FIXED, ELECTROLYTIC: 2 sec- tions, 250 uf -10% $+100\%$, 2 sections, 25 v dc; Sprague Electric Co. part no. D29668	183-1480-00
C212 thru C218 C219	CAPACITOR, FIXED, CERAMIC: same as C201	913-3013-00
C220	CAPACITOR, FIXED, PAPER: 0.1 uf $\pm 10\%$, 400 v dc; Sprague Electric Co. part no. 160P10494	931-0299-00
C221	NOT USED CAPACITOR, FIXED, CERAMIC: 0.01 uf -0% $+100\%$ at room temperature; 1600 v dcw; Centralab Division of Globe Union, Inc. part no. DD16-103 NOT USED	913-3522-00
C222 thru C250 C251	CAPACITOR, FIXED, CERAMIC: 0.001 uf $\pm 20\%$, 1000 v dc; Centralab Division of Globe Union Inc. part no. DA150-001CB	913-3742-00
C252 thru C258 C259	CAPACITOR, FIXED, CERAMIC: same as C251	913-3742-00
C260	CAPACITOR, FIXED, CERAMIC: 0.0015 uf $\pm 20\%$, 6000 v dc; Centralab type DD60	913-3539-00
CR201	CAPACITOR, FIXED, ELECTROLYTIC: 2000 uf -10% $+100\%$, 6 v dc; Sprague type DEE	183-1311-00
CR201	SEMICONDUCTOR DEVICE, DIODE: silicon; hermetically sealed; General Electric part no. 1N1492	353-1661-00
CR202	SEMICONDUCTOR DEVICE, DIODE: same as CR201	353-1661-00
CR203	SEMICONDUCTOR DEVICE, DIODE: same as CR201	353-1661-00
CR204	SEMICONDUCTOR DEVICE, DIODE: same as CR201	353-1661-00
CR205	RECTIFIER, METALLIC: selenium, 130 v ac input voltage, 50 ma dc; Sarkes-Tarzan, Inc. Model 50	353-0153-00
CR206	SEMICONDUCTOR DEVICE, DIODE: silicon; Sarkes, Tarzan, Inc. part no. 40M(M500)	353-1567-00
CR207	RECTIFIER, METALLIC: same as CR205	353-0153-00
CR208	RECTIFIER, METALLIC: same as CR205	353-0153-00
CR209	SEMICONDUCTOR DEVICE, DIODE: same as CR206	353-1567-00
CR210	SEMICONDUCTOR DEVICE, DIODE: silicon; Hughes Products part no. 1N457	353-0204-00
CR211	SEMICONDUCTOR DEVICE, DIODE: same as CR210	353-0204-00
CR212 thru CR216 CR217	SEMICONDUCTOR DEVICE, DIODE: same as CR201	353-1661-00
CR218	SEMICONDUCTOR DEVICE, DIODE: same as CR210	353-0204-00
DS201	LAMP, INCANDESCENT: 6.3 v, 0.150 amp design current, miniature bayonet base; T-3-1/4 clear bulb; 1.87 in. max lg o/a; General Electric type 47	262-3240-00
DS202	LAMP, INCANDESCENT: same as DS201	262-3240-00
DS203	LAMP, INCANDESCENT: same as DS201	262-3240-00
F201	FUSE, CARTRIDGE: 3.2 amps 125 v dc; ferrule terminal; Bussman Fuse Division of McGraw- Edison Co. part no. MDX-3 2/10	264-0216-00
F202	FUSE, CARTRIDGE: 250 v, 12 amps, ferrule terminals; Bussmann Fuse Division of McGraw- Edison Co. part no. ABC12	264-0397-00
F203	FUSE, CARTRIDGE: same as F202	264-0397-00
F204	FUSE, CARTRIDGE: 8 amps, 250 v dc; ferrule terminal; Bussmann Fuse Division of McGraw- Edison Co. part no. ABC8	264-0395-00
F205	FUSE, CARTRIDGE: 1 amp current rating, 250 v dc; ferrule terminals; glass enclosed; Bussmann Fuse type MDL & 3AG S/B	264-4280-00
H201	WASHER, FLAT: stainless steel, cadmium plated finish, 0.060 in. by 0.136 in. by 0.250 in.	504-0717-003
H202	NUT, FLAIN, KNURLED: brass; 15/32(0.468) in. -32NC-2 thd; 0.594 in. dia by 0.187 in. lg o/a dim.	503-8735-002

ITEM	DESCRIPTION	COLLINS PART NUMBER
H203	NUT, CAP, SHELF: aluminum, gray enamel finish; 1 in. across flats, 5/8 in. lg	544-6951-002
H204	PLATE: aluminum, chromate dip finish; 0.040 in. by 3/8 in. by 1 in.	545-9118-002
H205	NUT, PLAIN, HEXAGON: aluminum, chromate dip finish chamfered; 4-40 NC-2B thd; 0.250 in. w across flats, 0.500 in. h o/a	540-9168-003
H206	NUT, PLAIN, HEXAGON: aluminum alloy, chemical film finish; no. 8-32 thd, 0.250 in. w across flats by 0.500 in. h o/a	540-9250-003
H207	SPACER, SLEEVE: aluminum, chromate dip; 0.122 in. max id, 0.192 in. max od, 0.255 in. max lg o/a	541-5979-002
J201	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation, brass contacts; Cinch Mfg. Corp. part no. 201-11-01-018	360-0088-00
J202	JACK, TIP: same as J201	360-0088-00
J203	JACK, TIP: same as J201	360-0088-00
J204	CONNECTOR, RECEPTACLE, ELECTRICAL: 3 female contacts; low-loss plastic dielectric; 0.906 in. by 1.296 in. by 2.218 in. o/a dim.; Pass and Seymour, Inc. part no. DS2001	368-0115-00
K201	RELAY, ARMATURE: 1C, 15 amps, 115 v ac or 26.5 v dc; 6,000 ohms coil; Elgin Watch Co. type PC	970-1921-00
K202	RELAY, THERMAL: spst; 3 amp at 450 v ac or dc; 117 v; Thomas A. Edison Industries Division of McGraw Edison Co. part no. B2133	402-0331-00
K203	RELAY, ARMATURE: 2A, 15 amp, 110 v ac; 2A, 1 amp; 110 v ac; 42 ohm coil resistance; RBM Mfg. Co. part no. 98650-0416	970-1937-00
K204	RELAY, ARMATURE: 1B, 2 amp, 115 v ac; 0.35 ohms coil; Potter and Brumfield, Inc. part no. KR2609-2	970-1936-00
K205	RELAY, ARMATURE: 2B, 2 amp, 12 vdc, 120 ohms coil; Potter and Brumfield part no. KR2650-77342	970-1925-00
L201	REACTOR: 3.5 hy; 500 ma; 40 ohms resistance; Stancor Electronics, Inc. part no. 27488	668-0356-00
L202	REACTOR: 8 hy; 500 ma; 45 ohms resistance; Stancor Electronics, Inc. part no. 29397	668-0355-00
L203	COIL, RADIO FREQUENCY: universal wound, 3 pies, 675 turns; 2 mh nom inductance, 35 ma current rating; 2 #40 AWG copper wire leads; Fed. code 99800, Delevan Electronics part no. BP123	240-0084-00
M201	AMMETER: panel mtg.; dc; 200-0-500 ua; Simpson Electric type 27B	458-0483-00
M202	AMMETER: panel mtg.; dc; 0-1 amp; Simpson Electric type 27-B	458-0484-00
R201	RESISTOR, FIXED, WIREWOUND: 8.2 ohms $\pm 10\%$, 100 w; Ohmite	711-2026-00
R202	RESISTOR, FIXED, COMPOSITION: 470 ohms $\pm 10\%$, 2 w; Allen Bradley part no. HB	745-5638-00
R203	RESISTOR, FIXED, WIREWOUND: 5000 ohms $\pm 10\%$, 25 w; Ohmite Mfg. type 0212	710-3542-00
R204	RESISTOR, FIXED, WIREWOUND: 10.1 ohms $\pm 3\%$, 7 w; Dale Products Inc. part no. RS7/10R10G	746-9186-00
R205	RESISTOR, FIXED, WIREWOUND: 18,000 ohms $\pm 10\%$, 100 w; Ohmite	710-2133-00
R206	RESISTOR, FIXED, WIREWOUND: same as R205	710-2133-00
R207	RESISTOR, FIXED, WIREWOUND: same as R205	710-2133-00
R208	NOT USED	
R209	RESISTOR, FIXED, FILM: 806 ohms $\pm 1\%$, 1/2 w; IRC type MDC	705-7779-00
R210	RESISTOR, FIXED, COMPOSITION: 1000 ohms $\pm 5\%$, 2 w; Allen Bradley type HB	745-5651-00
R211	RESISTOR, FIXED, COMPOSITION: 1.0 meg-ohms $\pm 5\%$, 2 w; Allen Bradley type HB	745-5777-00
R212	RESISTOR, FIXED, COMPOSITION: same as R211	745-5777-00
R213	RESISTOR, FIXED, COMPOSITION: same as R211	745-5777-00
R214	RESISTOR, FIXED, COMPOSITION: same as R211	745-5777-00
R215	RESISTOR, FIXED, WIREWOUND: same as R201	710-2026-00
R216	NOT USED	
R217	RESISTOR, FIXED, COMPOSITION: 0.20 meg-ohms $\pm 5\%$, 1/2 w; Allen Bradley EB	745-1448-00
R218	RESISTOR, FIXED, COMPOSITION: 2200 ohms $\pm 10\%$, 1 w; Allen Bradley type GB	745-3366-00
R219	RESISTOR, VARIABLE, WIREWOUND: 5,000 ohms $\pm 10\%$, 2 w; Cgo. Tele. Supply type 252	377-0305-00
R220	RESISTOR, FIXED, COMPOSITION: 3300 ohms $\pm 10\%$, 1 w; Allen Bradley type GB	745-3373-00
R221	RESISTOR, FIXED, FILM: 110 ohms $\pm 1\%$, 1/4 w; IRC type MDB	705-7050-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
R222	RESISTOR, FIXED, WIREWOUND: 10 ohms, $\pm 5\%$, 12 w; Clarostat Manufacturing Co., Inc.	747-1114-00
R223	RESISTOR, FIXED, WIREWOUND: same as R222	747-1114-00
R224	NOT USED	
R225	RESISTOR, FIXED, COMPOSITION: 56 ohms $\pm 10\%$, 2 w; Allen Bradley type HB	745-5600-00
R226	RESISTOR, FIXED, FILM: 10,000 ohms $\pm 1\%$, 2 w; Texas Instruments	705-4009-00
R227	RESISTOR, FIXED, FILM: 1000 ohms $\pm 1\%$, 1/2 w; IRC type MDC	705-7596-00
R228	RESISTOR, FIXED, FILM: 12,100 ohms $\pm 10\%$, 1/4 w; IRC type MDB	705-7148-00
R229	RESISTOR, FIXED, COMPOSITION: same as R211	745-5777-00
R230	RESISTOR, FIXED, WIREWOUND: 35 ohms $\pm 10\%$, 25 w; Ward Leonard	735-0204-00
R231	RESISTOR, FIXED, COMPOSITION: 47,000 ohms $\pm 10\%$, 1 w; Allen Bradley type GB	745-3422-00
R232	RESISTOR, FIXED, WIREWOUND: 10 ohms $\pm 5\%$, 14 w; Clarostat Manufacturing Co., Inc.	747-0724-00
R233	RESISTOR, FIXED, WIREWOUND: same as R201	710-2026-00
R234	NOT USED	
R235	RESISTOR, FIXED, COMPOSITION: 4700 ohms $\pm 10\%$, 1 w; Allen Bradley type GB	745-3380-00
S201	SWITCH TOGGLE: 4 pdt, 30 amps, 125 v ac, 20 amps; 30 v dc, 20 amps resistive load; Cutler Hammer, Inc. part no. 7665K4	266-0072-00
S202	SWITCH, TOGGLE: spst; 250 v ac, 3 amp; 125 v ac, 6 amp; 120-240 v ac, 1/6 hp; Arrow, Hart and Hegeman Electric Co. part no. 83001	260-2613-00
S203	SWITCH, PUSH: spst, normally open; 0.5 amps at 250 v ac; black button marked "ON"; H.R. Kirkland type 1025-NO.	260-2696-00
S204	NOT USED	
S205	SWITCH, PUSH: spst, normally open, 125 v ac, 0.75 amps, 250 v ac, 0.25 amps; Culter Hammer, Inc. part no. 8411K4	260-2548-00
S206	HIGH VOLTAGE SHORTING SWITCH: c/o the following DISC: brass, bright alloy plated finish; 1 1/2 in. dia by 1/16 in. thk INSULATOR: phenolic; 0.250 in. by 0.260 in. by 1 in. SHAFT: CRES, passivate finish; 1/4 in. dia by 4 1/16 in. lg PLATE: cres, passivate finish; 0.0625 in. by 0.500 in. by 1.500 in. SPRING: CRES, passivate finish; 17/64 in. id by 1 5/8 in. lg	544-6905-002 544-6906-002 544-6924-002 544-6919-002 544-6922-002
S207	SWITCH, ROTARY: 2 circuit, 2 pole, 6 position, 2 sections, 2 moving contacts, 14 fixed contacts; Oak Mfg. Co. type AH	259-1027-00
S208	SWITCH, PUSH: spst; normally closed; 0.5 amp at 250 v ac; red button marked "OFF"; H.R. Kirkland type 1025 NC	260-2697-00
T201	TRANSFORMER, POWER, STEP-UP: 2 pri. 115 v ea; 50/60 cps; sec. 1, 6320 v, CT; sec. 2, 245 v; Stancor Electronics, Inc. part no. 29087	662-0351-00
T202	TRANSFORMER, POWER, STEP-DOWN: pri 115 v; 50/60 cps; sec. 2.5 v CT; Stancor Electronics, Inc. part no. 29212	662-0352-00
T203	TRANSFORMER, POWER, STEP-DOWN & STEP-UP: pri 115 v; 50/60 cps; sec. 1, 12.6 v; sec. 2, 125 v, CT; Stancor Electronics, Inc. part no. 27380	662-0353-00
TB201	TERMINAL BOARD: 5 terminals, barrier type, phenolic; 5/8 in. by 1-5/16 in. by 3-3/8 in.; Kulka Electric Mfg. Co., Inc. part no. 5-142-Y	337-0036-00
TB202	TERMINAL BOARD: phenolic, 1/16 in. by 2 in. by 2-3/16 in.	545-6149-002
V201	ELECTRONIC TUBE: rectifier type; Radio Corp. of America part no. 3B28	256-0096-00
V202	ELECTRON TUBE: same as V201	256-0096-00
XCR201	NOT USED	
XCR202	NOT USED	
XCR203	NOT USED	
XCR204	NOT USED	
XCR205	NOT USED	
XCR206	HOLDER, SEMICONDUCTOR DEVICE: solder-lug terminals, 2 in. lg overall; Bussmann Fuse Division of McGraw-Edison Co. part no. 2754	265-1057-00
XCR207	NOT USED	
XCR208	NOT USED	

ITEM	DESCRIPTION	COLLINS PART NUMBER
XCR209	HOLDER, SEMICONDUCTOR DEVICE: same as XCR206	265-1057-00
XDS201	LAMPHOLDER: for use with miniature bayonet bulb; 1-3/8 in. lg o/a; Micarta Fabricators, Inc. part no. DB718	262-1210-00
XDS202	LIGHT, INDICATOR: to be used with T-3-1/4, low voltage, midget bayonet base lamp; H.R. Kirkland Co. type 2025F	262-0627-00
XDS203	LAMPHOLDER: same as XDS201	262-1210-00
XF201	FUSEHOLDER: extractor post type; 250 v, 15 amp; accommodates one 0.250 in. dia by 1.250 in. lg cartridge fuse w/ferrule terminals; 0.687 in. dia by 2.140 in. lg o/a dim; Bussmann Fuse Division of McGraw-Edison Co. part no. HKP-HJR-ZZ	265-1019-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
XF202	FUSEHOLDER: same as XF201	265-1019-00
XF203	FUSEHOLDER: same as XF201	265-1019-00
XF204	FUSEHOLDER: same as XF201	265-1019-00
XF205	FUSEHOLDER: same as XF201	265-1019-00
XK201	NOT USED	
XK202	SOCKET, ELECTRON TUBE: stainless steel, phosphor bronze terminals, phenolic insulation; 0.812 in. by 1.187 in. by 1.625 in.; Amphenol-Borg Electronics Corp. part no. 88-8TM	220-1005-00
XV201	SOCKET, ELECTRON TUBE: 4 pin contact configuration silver plated copper contacts, ceramic body; 9/16 in. by 1-11/16 in. by 2 5/16 in. o/a dim; E.F. Johnson and Co. part no. 224	220-5450-00
XV202	SOCKET, ELECTRON TUBE: same as XV201	220-5450-00



1 RF Linear Amplifier, Schematic Diagram

C432-12-6

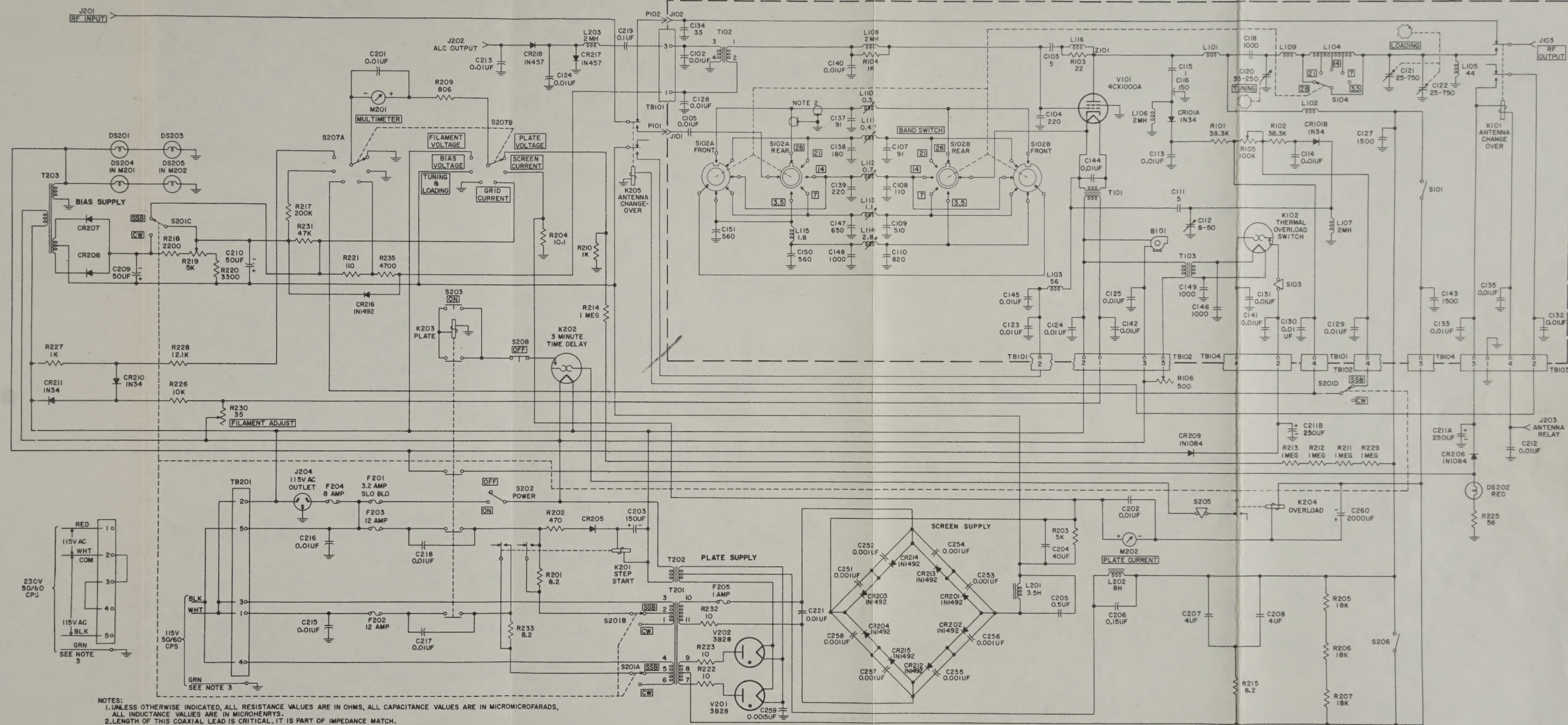


Figure 16. 30S-1 RF Linear Amplifier, Schematic Diagram

